LEVEL

DELAWARE RIVER BASIN

TRIBUTARY TO WYOMISSING CREEK, BERKS COUNTY

PENNSYLVANIA

NDI NO. PA.01146

DER NO. 6-467

STANFORD AVENUE STORMWATER RETENTION POND

OWNER: SPRING TOWNSHIP

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

prepared by

Woodward-Clyde Consultants

DACW31-81-C-0025

DEPARTMENT OF THE ARMY

Baltimore District, Corps of Engineers

Baltimore, Maryland 21203

JULY 1981

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DELAWARE RIVER BASIN
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NDI NO. PA 01146
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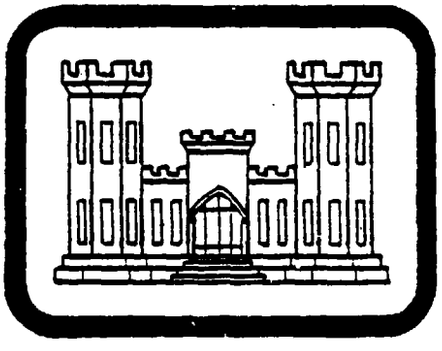

Prepared by:

WOODWARD-CLYDE CONSULTANTS
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Plymouth Meeting, Pennsylvania 19462

Submitted to:

DEPARTMENT OF THE ARMY
Baltimore District, Corps of Engineers
Baltimore, Maryland 21203

July 1981

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams for Phase I Investigations. Copies of these guidelines may be obtained from the Office of the Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I investigation is to expeditiously identify those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigations, testing and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify the need for more detailed studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through frequent inspections can unsafe conditions be detected, and only through continued care and maintenance can these conditions be prevented or corrected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the spillway design flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. The spillway design flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

Name of Dam:	Stanford Avenue Stormwater Retention Pond Dam
County Located:	Berks County
State Located:	Pennsylvania
Stream:	Tributary to Wyomissing Creek
Coordinates:	Latitude 40° 19.9'
	Longitude 75° 59.7'
Date of Inspection:	May 6, 1981

The Pond and Dam are owned by the Township of Spring and are used to control stormwater runoff. The main embankment is in good condition with the exception of the vegetation on the crest which is in poor condition. The dike is considered to be in poor condition and the spillway is considered to be in good condition.

In accordance with criteria established by Federal (OCE) Guidelines, the recommended spillway design flood for this "Small" size dam and "High" hazard classification is One-Half to the Full Probable Maximum Flood (PMF). Based on the relatively small capacity of the reservoir and the wide valley downstream of the embankment, one-half of the PMF event has been selected as the spillway design flood.

Hydrologic and hydraulic computations presented in Appendix D indicate that the spillway structure is capable of discharging one-half of the PMF without overtopping the embankment. Therefore, the spillway is considered to be "Adequate".

It is recommended that the following measures be undertaken as soon as practical. Items (1) and (2) should be performed under the supervision of a registered professional engineer experienced in the design and construction of dams.

(1) The downstream slope and crest of the dike should be repaired and stabilized to prevent further deterioration.

(2) The sand and crushed stone should be removed from the drain outlets. The drains should be monitored after the embankment has retained a significant head of water to verify that the material observed does not represent a migration of materials from beneath the spillway.

(3) The gullies at the downstream junction of the embankment and left abutment should be repaired. The embankment crest should be reseeded.

(4) Consideration should be given to installing a trash rack at the low level outlet in the event that the fence should fail during a large storm permitting large debris to enter the reservoir area.

Because of the potential for the excessive property damage and loss of life in the event of failure, a formal procedure of observation and warning during periods of high precipitation should be developed and implemented for this facility. This procedure should be coordinated with local emergency management authorities and should include a method of warning downstream residents that high flows are expected. In addition, an operational and maintenance procedure should be developed to insure that all pertinent items are carefully inspected on a regular basis and maintained in the best possible condition.

Mary F. Beck
Mary E. Beck, P.E.
Pennsylvania Registration 27447E
Woodward-Clyde Consultants

July 12, 1981
Date

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
MARY E. BECK
ENGINEER
027447-E

John H. Frederick, Jr., P.E.
Maryland Registration 7301
Woodward-Clyde Consultants

July 17, 1981
Date

STATE OF MARYLAND
John Henry Frederick, Jr.
No. 7301
REGISTERED PROFESSIONAL ENGINEER

APPROVED BY:

James W. Peck
Colonel, Corps of Engineers
Commander and District Engineer

28 July 81
Date

OVERVIEW FROM UPSTREAM SIDE
STANFORD AVENUE STORMWATER RETENTION BASIN
BERKS COUNTY, PENNSYLVANIA

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NATIONAL DAM INSPECTION PROGRAM
STANFORD AVENUE STORMWATER RETENTION POND
NATIONAL ID NO. PA 01146
DER NO. 6-467

SECTION 1
PROJECT INFORMATION

1.1 General.

a. Authority. The Dam Inspection Act, Public Law 92-367, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a program of inspection of dams throughout the United States.

b. Purpose. The purpose of the inspection is to determine if the dam constitutes a hazard to human life or property.

1.2 Description of Project.

a. Dam and Appurtenances. The dam for Stanford Avenue Stormwater Retention Pond (Stanford Avenue Dam) is a homogeneous earthfill dam with a maximum height of about 27 feet and a total length of about 483 feet. The dam has a main embankment crossing the valley and about 180 feet of the total length is a dike tying the right end of the embankment into natural ground. The 10-foot wide embankment crest, design elevation 360, is protected by sparse grass. The design upstream slope of the main embankment is variable, ranging from 1.5H:1V above elevation 355 to 2H:1V below elevation 345, and is protected with a stand of grass and Crownvetch. The design downstream embankment slopes are flatter, ranging from 2.75H:1V above elevation 355 to 6.5H:1V below elevation 340. The dike deflects upstream at an angle of about 110° with the main embankment. Upstream dike slopes range from about 2H:1V to 2.5H:1V. The crest width is nine feet. Downstream dike slopes range from 1.4H:1V to 1.5H:1V. The maximum height of the dike in the vicinity of the spillway is approximately 10 feet.

The concrete chute spillway consists of a level channel through the embankment and a chute down the embankment terminating at a stilling basin. The spillway channel through the embankment is 31.5 feet wide and 39 feet long with a six-foot deep cutoff wall at the dam centerline. The channel is at elevations 352.9 and 353.9 at the center and sides, respectively. The channel walls are inclined at approximately 1H:2V. The

concrete chute terminates in the stilling basin with four rows of baffle blocks. Low flows are discharged from the reservoir via a 36-inch concrete pipe with an invert at elevation 333, the bottom of the reservoir. The uncontrolled conduit discharges into the storm sewer system. The conduit is supported on a concrete cradle and has five anti-seep collars spaced 15 feet apart starting eight feet from the inlet.

b. Location. The dam is located across a tributary to Wyomissing Creek in Spring Township, Berks County, Pennsylvania, and is immediately upstream of the community of Lincoln Park. The site is shown on the USGS Quadrangle Map entitled "Reading, Pennsylvania" at coordinates N 40° 19.9', W 75° 59.7'. A Regional Location Plan of the Stanford Avenue Dam is enclosed as Plate 1, Appendix E.

c. Size Classification. The dam is classified as a "Small" size structure by virtue of its 27-foot height and less than 1,000 acre-foot reservoir capacity to the top of the dam.

d. Hazard Classification. A "High" hazard classification is assigned consistent with the potential for excessive economic loss and more than a few lives lost in the event of a dam failure. See Section 3.1, Paragraph e.

e. Ownership. The dam is owned by the Township of Spring. All correspondence can be sent to Sharon E. Weiss, Township Secretary, at the Spring Township Building, 2800 Shillington Road, Cornwall Terrace, Reading, Pennsylvania 19547.

f. Purpose of the Dam. This dam is used to control stormwater runoff.

g. Design and Construction History. In July 1977, Marvin W. Waid, P.E., Township Engineer, submitted to the Department of Environmental Resources (DER) a copy of the plans and specifications for the construction of Stanford Avenue Dam, together with the formal application for the permit to build. In August Mr. Waid also submitted a copy of the Stormwater Management report prepared by Gannett, Fleming, Corddry and Carpenter, Inc., January 1976, and a copy of the geotechnical report for the dam prepared by F. T. Kitlinski and Associates, Inc. The permit to build the dam was issued by the State on February 28, 1978.

Construction began March 27, 1978. J. Robert Bazley, Inc., Pottsville, Pennsylvania, was the contractor. The township hired a full-time inspector who was under the supervision of the Township Engineer. The dam was completed November 10, 1978.

h. Normal Operating Procedures. Under normal conditions all flow is discharged through the low flow outlet to the storm sewer system. During large storms the limited capacity of the low stage outlet causes water to pond in the reservoir area. Runoff from large storms would pond in the reservoir until discharge also flows over the concrete spillway. Some spillway discharge also enters the storm sewer system but when the spillway discharge is large, water flows overland through the streets before re-entering the stream channel.

1.3 Pertinent Data.

A summary of pertinent data for Stanford Avenue Dam is presented as follows:

a.	Drainage Area (square miles)	
	Measured from USGS Map	0.63
	From Stormwater Management Report (used in hydrology/hydraulic evaluation)	1.00
b.	Discharge at Dam Site (cfs)	
	Maximum Known Flood (February 1979) (low flow outlet)	70
	At Minimum Embankment Crest	
	Emergency spillway	1350
	Low flow outlet	190
c.	Elevation (feet above MSL)	
	Top of Dam	
	(existing)	359.0
	(design)	360.0
	Spillway Crest	
	(existing)	352.9
	(design)	353.0
	Downstream Toe	332.0
d.	Reservoir (feet)	
	Length at Normal Pool	N/A
	Length at Maximum Pool	1275
e.	Storage (acre-feet)	
	Normal Pool	N/A
	Emergency Spillway (est)	78
	Top of Dam (est)	135
f.	Reservoir Surface (acres)	
	Normal Pool	N/A, dry
	Emergency Spillway Crest	7
	Top of Dam	9

g.	Dam Data	
	Type	Homogeneous earthfill
	Length	483
	Side Slopes	
	Upstream	
	above 355	1.5H:1V
	between 355 and 345	1.75H:1V
	below 345	2H:1V
	Downstream	
	above 355	2.75H:1V
	between 355 and 345	2.35H:1V
	between 345 and 340	3H:1V
	below 340	6.5H:1V
	Height (above downstream toe)	27 feet
	Crest Width	10 feet
	Cutoff	none
	Grout Curtain	none
h.	Spillway	
	Type	Concrete chute spillway
	Elevation at Crest	352.9 feet
	Width	31.5 feet
	Length	150 feet
i.	Outlet Works	
	Type	Uncontrolled 36-inch RCP conduit
	Inlet invert elevation	333 feet

SECTION 2
ENGINEERING DATA

2.1 Design.

a. Data Available. Original engineering data for Stanford Avenue Dam is located in the Township Engineer's office. A listing of data is enclosed as Appendix B. All data were made available for review.

b. Design Features. Plan and sectional views of the dam are shown on Plates 2, Appendix E. A summary of the features of the dam is included in Section 1.3.

2.2 Construction.

The known construction history is presented in Section 1.2, paragraph g. Complete construction records are on file at the Township Engineer's office.

2.3 Operational Data.

There are no operational records maintained for this dam.

2.4 Evaluation.

a. Availability. All information presented herein was obtained from reports, plans and correspondence located in the Township Engineer's office and supplemented by conversations with the Township Engineer.

b. Adequacy. Data located in the Township Engineer's files were sufficient to evaluate the engineering aspects of this dam with the exception of spillway adequacy.

c. Validity. There is no reason to question the validity of the available data.

SECTION 3

VISUAL INSPECTION

3.1 Findings.

a. General. Observations and comments of the field inspection team are contained in the checklist enclosed herein as Appendix A, and are summarized and evaluated in the following subsections. In general, the appearance of the facilities indicates that the spillway and main embankment are currently in good condition, the dike is in poor condition and the vegetative cover condition ranges from poor to good.

b. Dam. The horizontal and vertical alignment of the dam crest was checked and the profile is shown on sheet 5B, Appendix A. The horizontal alignment of the main embankment is straight instead of curved as shown on Plate 2, Appendix E. The design crest elevation for the main embankment and dike is 360. Measured elevations along the main embankment ranged from 359.0, at the left abutment to 359.8 near the maximum section. Measured elevations along the dike ranged from a low of 359.0 near its midpoint to 360.8 at the right abutment.

No damage to the main embankment by erosion, foot traffic or sloughing of surficial soils was noted. The upstream junction of the abutment and left end of the dam is in good condition. The downstream junction of the left abutment and the embankment has suffered some erosion where gullies up to about six inches deep were noted, Photograph 16. The upstream slope and crest of the dike appear to be in good condition with the exception of a small animal burrow on the crest of the dike. The slope of the downstream side of the dike is fairly steep, 1.4H:1V to 1.5H:1V, and surficial materials are sloughing off, Photograph 14.

The upstream main embankment slope measurements made with an Abney level and visually averaged indicate the upstream slope at the maximum section was constructed as designed and the slopes appear flatter in the vicinity of the left abutment. The slope is protected by vegetation, considered to be in fair condition, consisting of grasses, Crownvetch and clover. The crest is 10 feet wide and is protected by a poor growth of vegetation. On the crest adjacent to the spillway, the vegetation is extremely sparse, Photograph 12, and minor desiccation cracking was noted. No foot traffic or vehicle traffic ruts or damage were noted to the crest or any of the embankment slopes. The downstream embankment slopes also appear

to be constructed as designed at the maximum section and flatter in the area of the left abutment. The downstream embankment slope is protected by a thick growth of vegetation, Photograph 15.

c. Appurtenant Structures. Normal flows are conveyed through the embankment and into the downstream storm sewer system by a 36-inch reinforced concrete pipe installed with rubber gaskets and supported by a concrete cradle. The entrance to the uncontrolled low flow outlet is at the upstream toe and the invert elevation is 333, Photograph 9. The upstream 100 feet of the conduit was inspected, and three of the joints under the maximum section were found not to be flush. There was no indication of soil intrusion through the joints.

The emergency spillway appears to be in good condition with some cracks on the spillway walls, Photograph 3, with leachate deposits at the lower end. There were five four-inch diameter relief drains which exit the chute slab at elevation 339.8. An accumulation of fine sandy material and crushed stone was noted at four of the five drain outlets, Photograph 4. The spillway channel immediately downstream of the energy dissipator is protected by riprap, Photograph 5.

d. Reservoir. The reservoir has a uniform shape resulting from its being excavated. The reservoir, as is the spillway and the dam, is completely enclosed by a chainlink fence. Low flows are conducted through the reservoir along the paved ditch. The watershed's slopes are flat to moderate. The watershed is open with residential development increasing the amount of runoff.

e. Downstream Channel. The spillway discharge flows for about 320 feet to the first obstruction, the embankment for the proposed West Wyomissing Boulevard. Surface runoff from the area between the dam and the boulevard is conveyed to the storm sewer system through a 43-inch by 63-inch elliptical reintorced concrete culvert, Photograph 6. Larger flows, such as when the emergency spillway functions, are conveyed through the embankment by an 84-inch reinforced concrete culvert. The entrance is shown in Photograph 6 and the discharge channel is shown in Photograph 7. The downstream end of the culvert is gated to prevent access to the dam. Flow through the 84-inch culvert discharges through the channel and toward the street, Photograph 8, and would be carried overland by the streets through Lincoln Park towards Wyomissing Creek. About 1200 feet downstream of the dam are the first two houses that would be affected by large flows through the spillway or failure of the dam. The first floors of those houses are 3.0 to 3.5 feet above the street. Large spillway flows or a dam failure flood wave would flow

through an urban area of single family homes with lot sizes of about one quarter acre. It is estimated that a rapid failure of the dam at full pool would produce excessive economic loss with more than a few lives lost. Therefore, a "High" hazard potential classification is indicated for this structure.

3.2 Evaluation.

In summary, the visual survey of the dam disclosed two items requiring maintenance in order to prevent deterioration of the embankment or dike. The vegetation protecting the main embankment crest is in poor condition and requiring reseeding. The downstream slope of the dike is fairly steep, the vegetation is in poor condition and surficial soils are sloughing. This slope should be stabilized to prevent further damage. At this time, the gullying noted at the downstream junction of the embankment and left abutment is fairly minor. However, it should be repaired and the area monitored after every large rainstorm.

It is also noted that the low level outlet is not protected from large debris by a trash rack. Although the entire reservoir area is fenced, the possibility exists that during a large event the fence could be broken permitting large debris to enter the reservoir and clog the low level outlet.

SECTION 4
OPERATIONAL PROCEDURES

4.1 Procedures.

Operation of the dam does not require a dam tender. All flow discharges through the low level outlet into the storm sewer system or extremely large flows would flow over the spillway and overland to the stream.

4.2 Maintenance of the Dam.

Maintenance is provided by the Township.

4.3 Maintenance of the Operating Facilities.

There are no operating facilities for this structure.

4.4 Warning Systems in Effect.

There are no formal warning systems or procedures to be followed during an event of an exceedingly heavy rainfall. The engineer indicated that the Township would warn downstream residents in the event of flows over the spillway.

4.5 Evaluation.

It is judged that the current operating procedure which does not require a dam tender is a realistic means of operating the Stanford Avenue Dam as there are no control features.

There are no written operational and maintenance procedures or any type of warning system beyond the informal warning system followed by the Township. Maintenance and operating procedures should be developed including a checklist of items to be observed and inspected on a regular basis.

Since a formal warning procedure does not exist, one should be developed and implemented during periods of extreme rainfall. This should be coordinated with local emergency management officials and should consist of a method of notifying residents downstream that potentially high flows are imminent or dangerous conditions are developing.

SECTION 5
HYDROLOGY/HYDRAULICS

5.1 Evaluation of Features.

a. Design Evaluation Data. Original design data are located in the Township Engineer's files and are summarized on Sheet 4, Appendix D. Calculations indicated the spillway capacity was adequate to discharge the peak inflow value from a 50-year, three-hour duration storm. The spillway capacity with a three-foot head was estimated to be 549 cfs and the peak inflow value was calculated to be 563 cfs. Very small spillway flows enter the storm sewer system. Larger spillway discharges flow through the streets of Lincoln Park to the stream channel. Hydrologic and hydraulic evaluations made as a part of this investigation are contained in Appendix D.

The watershed is "L" shaped with a maximum length along the watercourse of just under two miles and the watershed averages about 2,000 feet wide, having a total drainage area of 0.63 square miles. The watershed as shown on Plate 1, Appendix E, includes only areas which would drain by overland flow into Stanford Avenue Stormwater Retention Pond. The Stormwater Management report prepared by Ganett, Fleming, Corddry and Carpenter, Inc., for Spring Township, indicates a total drainage area above the Stanford Avenue Dam of 642 acres. This larger value may have been determined from more detailed maps of the watershed area or include areas that discharge through the storm sewer systems into the reservoir. Elevations range from a high of about 860 feet in the upper reaches of the watershed to the low level outlet invert of 333 feet. The watershed is predominantly open and approximately half of the area has been developed residentially. Residential development can be expected to continue throughout the watershed.

In accordance with criteria established by Federal (OCE) Guidelines the recommended spillway design flood for this "Small" size dam and "High" hazard potential classification is One-Half to the Full Probable Maximum Flood (PMF). Because of the small total capacity of the reservoir and the unconfined downstream valley, the selected spillway design flood is one-half of the PMF.

b. Experience Data. The maximum depth of water in the reservoir was six feet in February 1979.

c. Visual Observations. The only observed condition that would indicate a possible reduction in emergency spillway capacity during the spillway design flood is the one-foot below design elevation of the dike and the left abutment. Other

observations regarding the condition of the downstream channel, spillway and reservoir are presented in Appendix A and are discussed in greater detail in Section 3.

d. Overtopping Potential. The overtopping potential of this dam was estimated using the HEC-1, Dam Safety Version, Computer Program. A brief description of the program is included in Appendix D. Calculations indicate that the maximum spillway capacity is about 1,350 cfs when the reservoir level is at the minimum embankment crest elevation. The HEC-1 computed one-half PMF peak inflow, based on a one square mile drainage area, is 1,041 cfs. As the spillway capacity is greater than the estimated peak inflow value, no reservoir routing was performed.

e. Spillway Adequacy. As the spillway will discharge one-half of the PMF peak inflow value without overtopping the embankment, the spillway classification is considered "Adequate".

f. Downstream Conditions. The first downstream obstruction is the embankment for the proposed West Wyomissing Boulevard. Large spillway discharges are conveyed through the 17-foot high embankment via an 84-inch reinforced concrete culvert with an estimated capacity of 600 cfs. In the event of a dam failure, it is considered likely that the roadway embankment would also fail. About 1200 feet downstream of the dam are the first two houses which would be affected by failure of the dam. The first floors of these houses are 3.0 to 3.5 feet above the street. The flood flow resulting from spillway flows and possible dam failure, as well as possible failure of the roadway embankment, would flow through an urban area of single family homes for 1500 feet before rejoining the relocated stream bed. It is estimated that a rapid failure of the dam at full pool would produce excessive economic loss with more than a few lives lost. Therefore, a "High" hazard classification is indicated for this structure.

SECTION 6
STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability.

a. Visual Observations. With the exception of the minor gullying at the downstream junction of the embankment and left abutment and the surficial sloughing of soils on the downstream slope of the dike, there were no external indications of embankment instability. It is to be noted that sandy material and crushed stone is at the outlet of four of the five relief drains under the concrete spillway chute slab.

b. Design and Construction Data. F. T. Kitlinski and Associates, Inc., performed the Soils and Foundation Investigation. Augered test borings were carried 15 feet deep or to refusal and six borings were drilled 10 feet into rock. Laboratory testing included physical properties and compaction tests. Borrow materials from the reservoir area were identified as silty clays or clayey silts with natural water contents higher than the optimum water content indicated by compaction testing. Construction recommendations were: any exposed rock outcrops in the reservoir area were to be covered by two-feet of compacted impervious material to prevent water percolation into the underlying limestone, proof-rolling the foundation with rubber tire vehicles weighing not less than 60 tons, and eight-inch lift thickness with maximum six-inch rock size compacted to 95% maximum dry density as determined by the Standard Dry Density test, ASTM D 698-70. During construction, frequent in-place density tests were made. Any material not meeting the required density was removed or recompacted and retested.

There are no stability analyses of the embankment in existence. Based on the lack of visual signs of significant deterioration and the geometric configuration of the main embankment, it is qualitatively assessed that the stability of the main embankment is adequate. However, based on the sloughing of the downstream dike slope and the steep slope, 1.4 to 1.5H:1V, the continued stability of this dike is considered to be marginal.

c. Operating Records. There are no operational or maintenance records maintained for this dam.

d. Post-Construction Changes. There is no record nor is there any evidence that any major modifications were made to the dam since construction.

e. Seismic Stability. The dam is located in Seismic Zone 1. Normally it can be considered that if a dam in this zone is stable under static loading conditions, it can be assumed safe for any expected earthquake conditions. As the main embankment is qualitatively assessed to be stable under seismic loading conditions, it can be reasonably assumed to be stable under seismic loading conditions. As the stability of the dike is deteriorating and the stability is considered to be marginal, the dike may not be stable under seismic loading conditions.

SECTION 7
ASSESSMENT/REMEDIAL MEASURES

7.1 Dam Assessment.

a. Evaluation. Visual inspection indicates that the main embankment of Stanford Avenue Stormwater Retention Pond is in good condition with the exception of the vegetation on the crest which is in poor condition. The dike is considered to be in poor condition and the spillway is considered to be in good condition.

In accordance with criteria established by Federal (OCE) Guidelines, the recommended spillway design flood for this "Small" size dam and "High" hazard classification is One-Half to the Full Probable Maximum Flood (PMF). Based on the relatively small capacity of the reservoir and the wide valley downstream of the embankment, one-half of the PMF event has been selected as the spillway design flood.

Hydrologic and hydraulic computations presented in Appendix D indicate that the spillway structure is capable of discharging one-half of the PMF without overtopping the embankment. The spillway is therefore considered to be "Adequate".

b. Adequacy of Information. The combined visual inspection, review of design information and simplified calculations presented in Appendix D were sufficient to indicate that only repairs are required for this structure.

c. Urgency. It is recommended that the measures presented in Section 7.2 be implemented as specified.

7.2 Remedial Measures.

a. Facilities It is recommended that the following measures be undertaken as soon as practical. Items (1) and (2) should be performed under the supervision of a registered professional engineer experienced in the design and construction of dams.

(1) The downstream slope and crest of the dike should be repaired and stabilized to prevent further deterioration.

(2) The sand and crushed stone should be removed from the drain outlets. The drains should be monitored after the embankment has retained a significant head of water to verify that the material observed does not represent a migration of materials from beneath the spillway.

(3) The gullies at the downstream junction of the embankment and left abutment should be repaired. The embankment crest should be reseeded.

(4) Consideration should be given to installing a trash rack at the low level outlet in the event that the fence should fail during a large storm permitting large debris to enter the reservoir area.

b. Operation and Maintenance Procedures. Because of the potential for property damage and loss of life in the event of a failure, a formal procedure of observation and warning during periods of high precipitation should be developed and implemented for this facility. This procedure should be coordinated with local emergency management authorities and should include a method of warning downstream residents that high flows are expected. In addition, an operation and maintenance procedure should also be developed to insure that all pertinent items are carefully inspected on a regular basis and maintained in the best possible condition.

APPENDIX

A

CHECK LIST
VISUAL INSPECTION
PHASE I

Name Dam *Stanford Avenue Storm Water Retention*

County *Berks* State *Pennsylvania*

NDI# *PA 01146* DER# *6-467* Type of Dam *Earth*

Hazard Category *High*

Date(s) Inspection *May 6, 1981*

Weather *Cloudy* Temperature *60's*

Pool Elevation at Time of Inspection *dry* M.S.L.

Tailwater at Time of Inspection *N/A* M.S.L.

Inspection Personnel:

Mary F. Beck	*Paul F. Marano*
Raymond S. Lambert	*Vincent McKeever*
Richard E. Mabry	*John H. Frederick, Jr. (Principal)*

(4/28/81)

Mary F. Beck Recorder

Remarks: *Mr. Marvin W. Waid, P.E., Township Engineer, and Mr. George Sponagle of Spring Township were on site and provided assistance to the inspection team.*

CONCRETE/MASONRY DAMS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
ANY NOTICEABLE SEEPAGE	N/A	
STRUCTURE TO ABUTMENT/ EMBANKMENT JUNCTIONS	N/A	
DRAINS	N/A	
WATER PASSAGES	N/A	
FOUNDATION	N/A	

CONCRETE/MASONRY DAMS

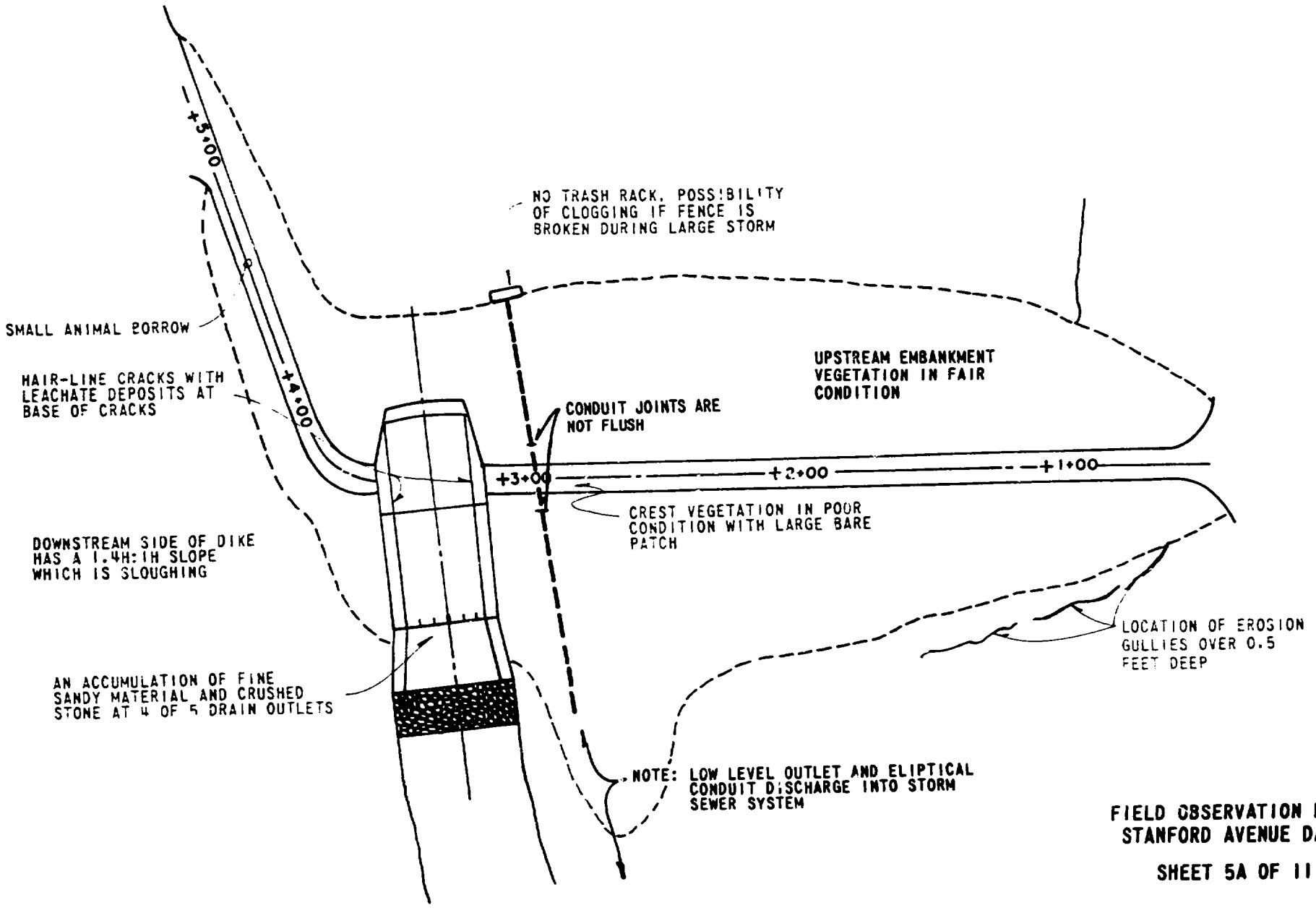
VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS CONCRETE SURFACES	N/A	
STRUCTURAL CRACKING	N/A	
VERTICAL AND HORIZONTAL ALIGNMENT	N/A	
MONOLITH JOINTS	N/A	
CONSTRUCTION JOINTS	N/A	

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	*Surficial dessication cracks were noted where embankment vegetation was sparse.*
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	*None observed.*
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	*No sloughing or erosion was noted on the main embankment or abutment slopes. The downstream side of the dike has a slope of about 1.4H:1V and is sloughing.*
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST	*See sheets 5A and 5B.*
RIPRAP FAILURES	*N/A - no riprap.*

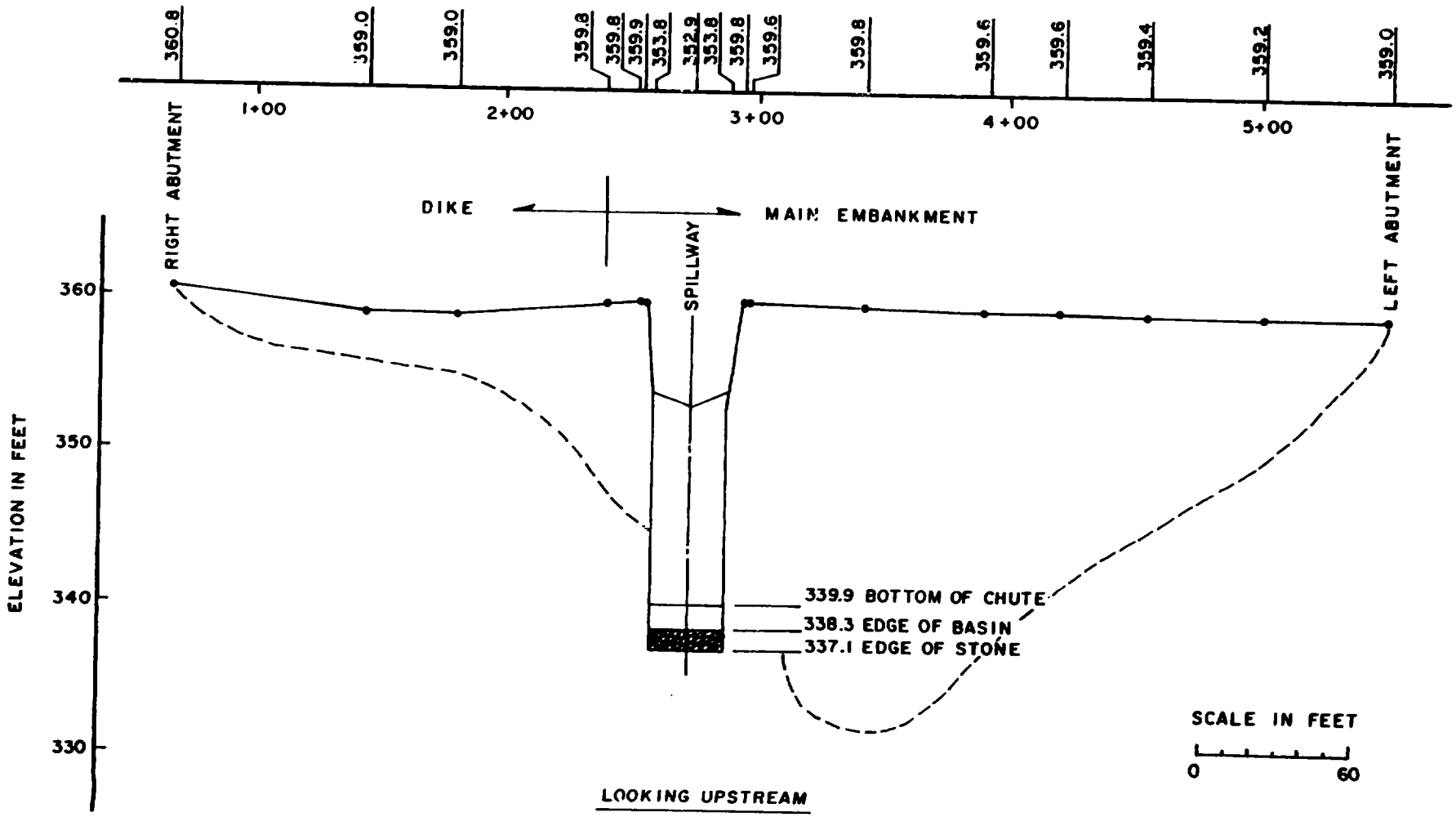
EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
Vegetation	*The vegetation was a mixture of Crownvetch, clover and grass. The downstream embankment vegetation was in good condition, the crest vegetation was in poor condition and the upstream embankment vegetation was in fair condition.*	
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	*Significant erosion has occurred at the left downstream junction. Gullies about six inches deep were observed.*	
ANY NOTICE-ABLE SEEPAGE	*None, dry reservoir.*	
STAFF GAGE AND RECORDER	*Staff gage located at low level outlet.*	
DRAINS	*None*	



FIELD OBSERVATION PLAN
STANFORD AVENUE DAM

SHEET 5A OF 11



PROFILE ALONG CREST
STANFORD AVENUE DAM

OUTLET WORKS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	*None. The 6th and 9th joints from the upstream end are not flush by 0.75 inches. No evidence of soil entering the conduit was observed.*	
INTAKE STRUCTURE	*Concrete headwall in good condition.*	
OUTLET STRUCTURE	*None*	
OUTLET CHANNEL	*None, discharges into the storm sewer system.*	
EMERGENCY GATE	*None*	

UNGATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	*The concrete chute spillway is in good condition with hairline cracks on the walls with small amount of leachate deposits at the base of some cracks. Five 4-inch diameter drains exit the chute slab upstream of the energy dissipators. Accumulation of fine sandy material and crushed stone was noted at four of the five drains.*
APPROACH CHANNEL	*None*
DISCHARGE CHANNEL	*The channel is in good condition, protected by a fair stand of vegetation.*
BRIDGE AND PIERS	*About 230 feet downstream of the spillway energy dissipator, spillway flow discharges under a road embankment via a 43" x 68" RCP culvert entering the storm sewer system and an 84-inch RCP conduit discharging downstream of the road embankment.*

GATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
TYPE	*None*	
APPROACH CHANNEL	*N/A*	
DISCHARGE CHANNEL	*N/A*	
BRIDGE AND PIERS	*N/A*	
GATES AND OPERATION EQUIPMENT	*N/A*	

INSTRUMENTATION

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
MONUMENTATION/ SURVEYS	*None*	
OBSERVATION WELLS	*None*	
WEIRS	*None*	
PIEZOMETERS	*None*	
OTHER	*None*	

RESERVOIR

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	*Reservoir side slopes are moderate and well vegetated. The entire dam and reservoir area are enclosed by a chain-link fence preventing large debris from entering the reservoir.*	
SEDIMENTATION	*None observed*	
WATERSHED	*The watershed slopes are flat to moderate. The area is open with residential development increasing the amount of runoff.*	

DOWNSTREAM CHANNEL

VISUAL EXAMINATION OF	OBSERVATIONS REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	*About 230 feet downstream of the spillway energy dissipator is a 17-foot high roadway embankment with two conduits under it, see sheet 7.*
SLOPES	*The channel slope between the spillway and road embankment is about 0.034. Downstream of the embankment large spillway flow would discharge onto the street which has an estimated slope of 0.0089.*
APPROXIMATE NO. OF HOMES AND POPULATION	*About 1200 feet downstream of the dam are the first two houses whose first floors are three to 3.5 feet above the street. Large spillway flows or a dam failure flood wave would flow through an urban area of single family homes with lot sizes of about 0.25 acre.*

APPENDIX

B

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE I

NAME OF DAM Stanford Avenue Stormwater Retention Pond

NDI NO. PA 01146 DER NO. 6-467

ITEM	REMARKS
AS-BUILT DRAWINGS	None
REGIONAL VICINITY MAP	See Plate 1, Appendix E
CONSTRUCTION HISTORY	See Text, Section 1.2, Paragraph g.
TYPICAL SECTIONS OF DAM	See Appendix E
OUTLETS - PLAN	Appendix E
DETAILS	
CONSTRAINTS	
DISCHARGE RATINGS	- None

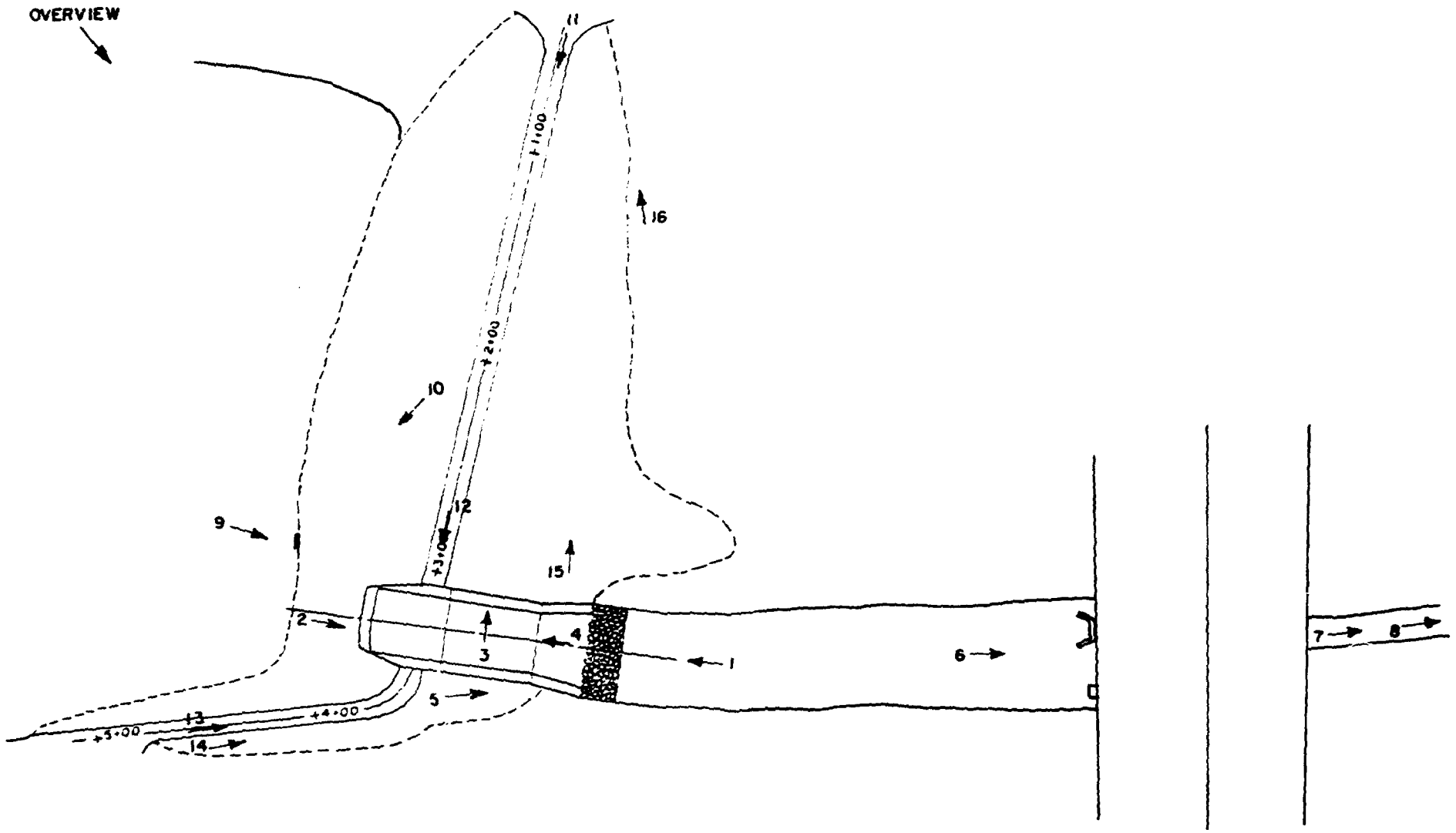
ITEM	REMARKS
RAINFALL/ RESERVOIR RECORDS	None maintained by owner.
DESIGN REPORTS	Soils and Foundation Investigation, F.T. Kitlinski and Associates, Inc., 1977. Stormwater Management Report, Gannett Fleming Corddry and Carpenter, Inc., 1976.
GEOLOGY REPORTS	See Appendix F.
DESIGN COMPUTATIONS HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES	See Text, Appendix D.
MATERIALS INVESTIGATIONS BORING RECORDS LABORATORY FIELD	Complete records are located in the Township Engineer's files
POST CONSTRUCTION SURVEYS OF DAM	None

ITEM	REMARKS
BORROW SOURCES	Reservior area
MONITORING SYSTEMS	None
MODIFICATIONS	None
HIGH POOL RECORDS	No formal records maintained
POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS	None
PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS	None
MAINTENANCE OPERATION RECORDS	None

ITEM	REMARKS
SPILLWAY PLAN	
SECTIONS	See Appendix E
DETAILS	
OPERATING EQUIPMENT PLANS AND DETAILS	None
MISCELLANEOUS	Also located in the Township Engineer's files: 1. More than 50 color photographs taken during construction 2. Daily Field Inspection Reports

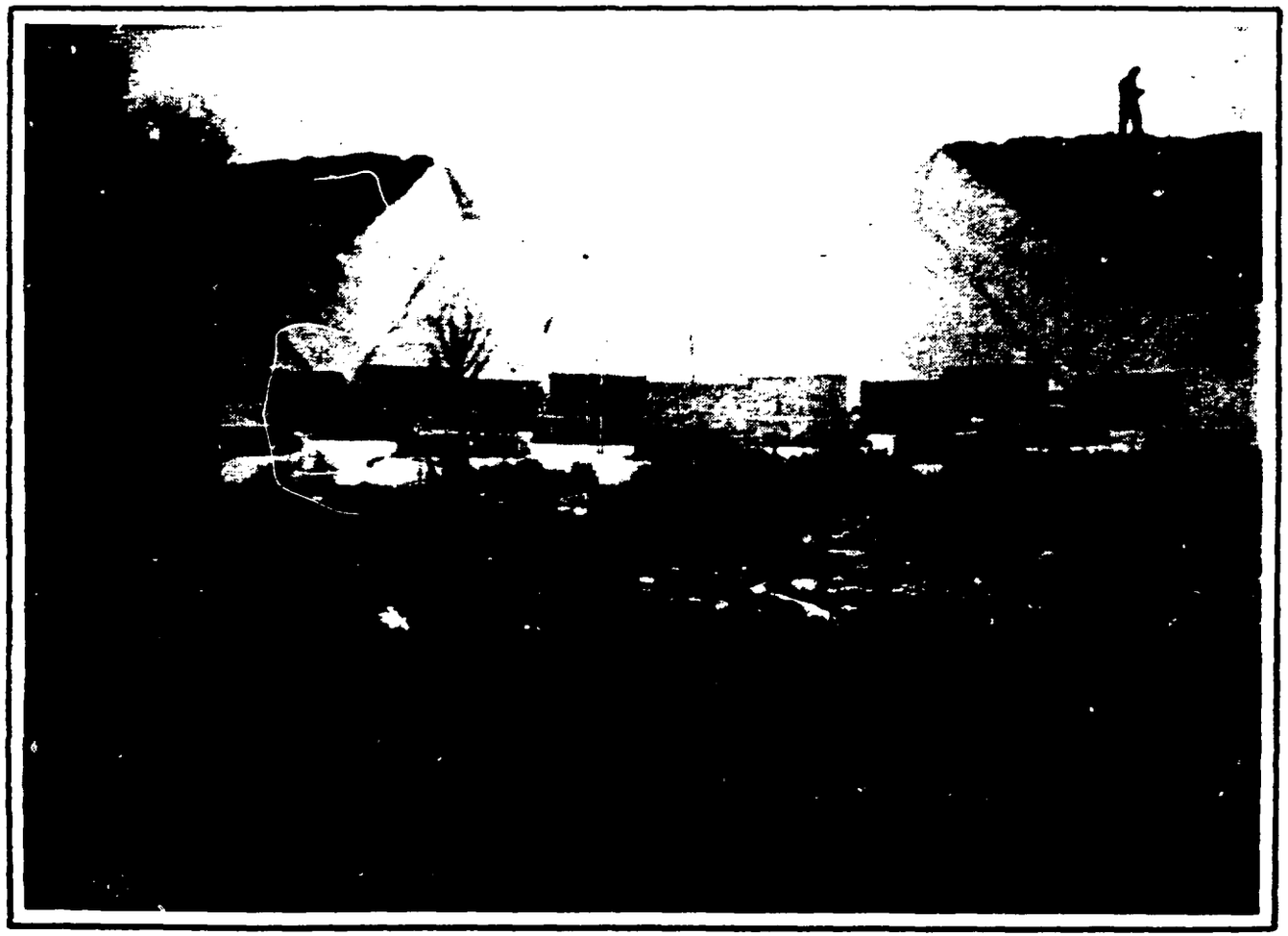
APPENDIX

C



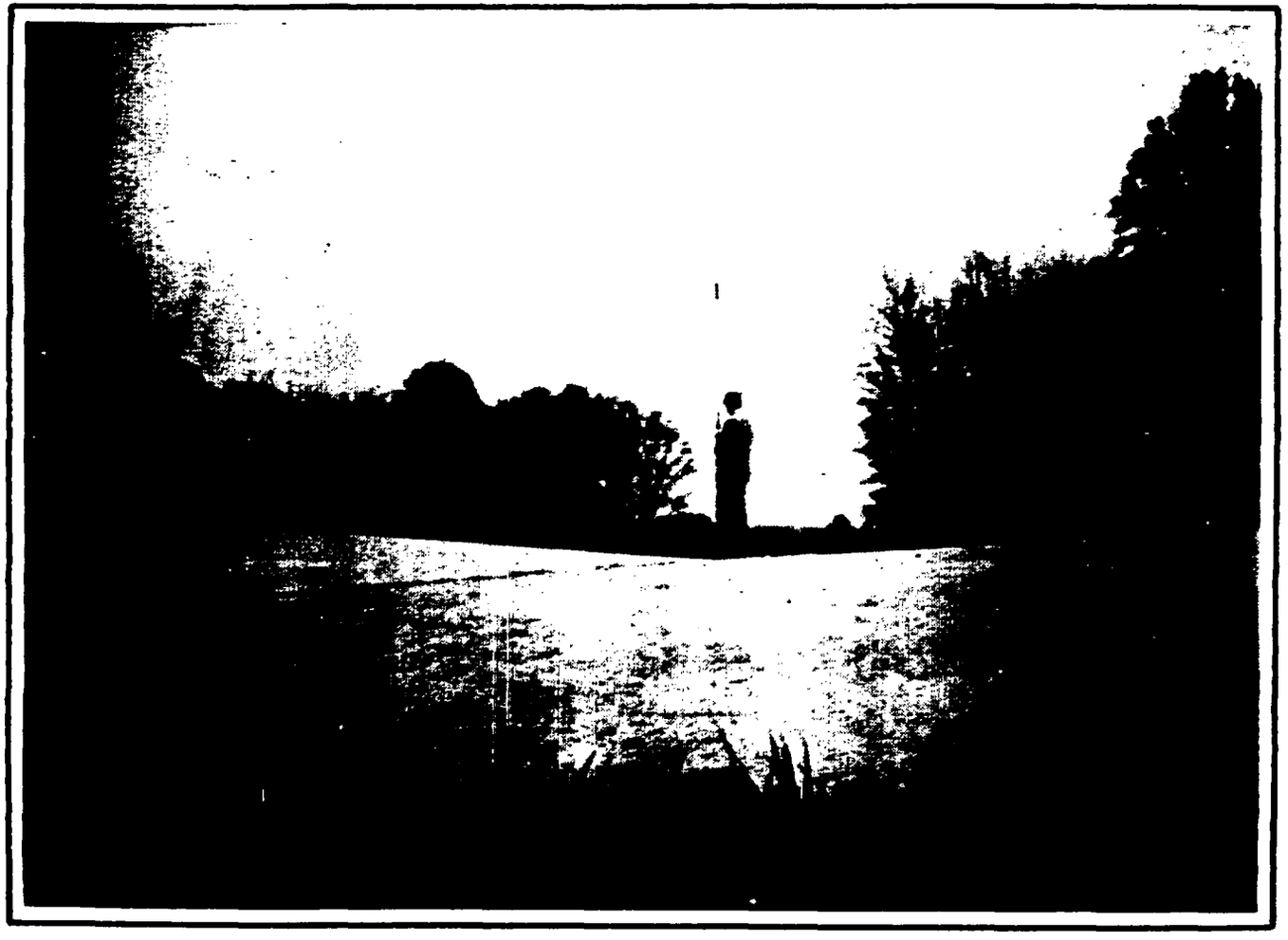
PHOTOGRAPH LOCATION PLAN
STANFORD AVENUE DAM

PLATE C-1



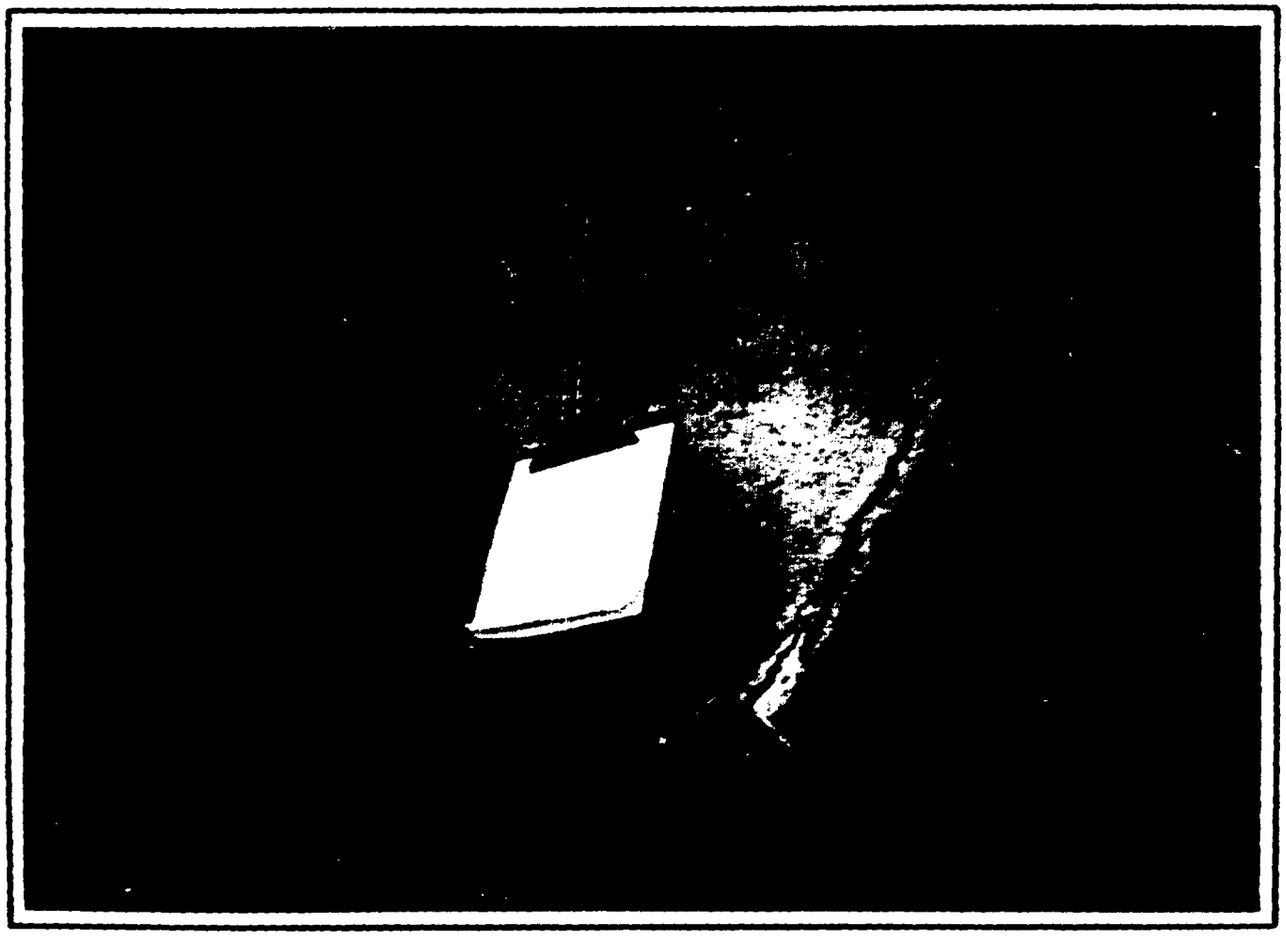
CONCRETE CHUTE SPILLWAY.

PHOTOGRAPH 1



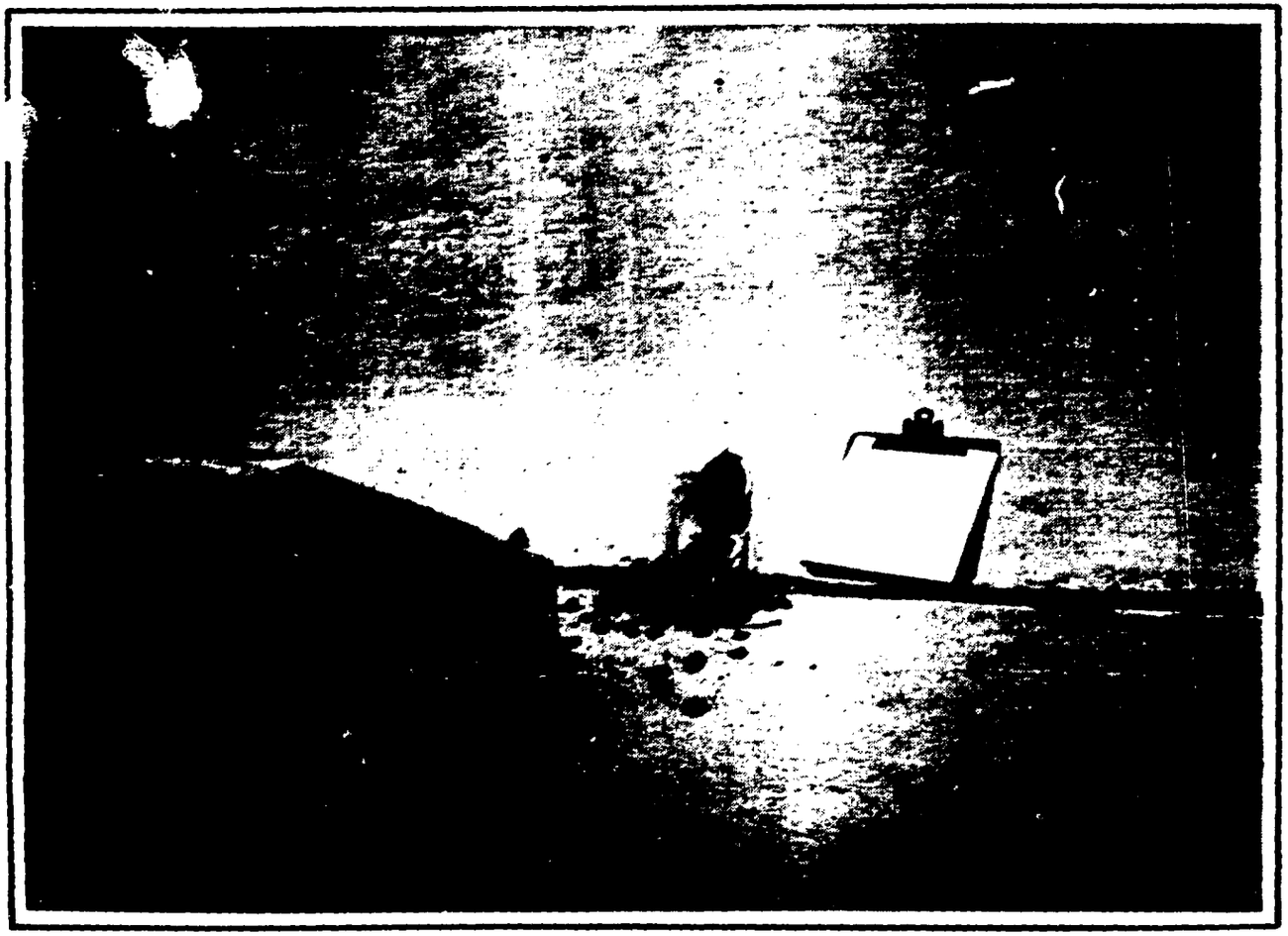
UPSTREAM END OF SPILLWAY.

PHOTOGRAPH 2

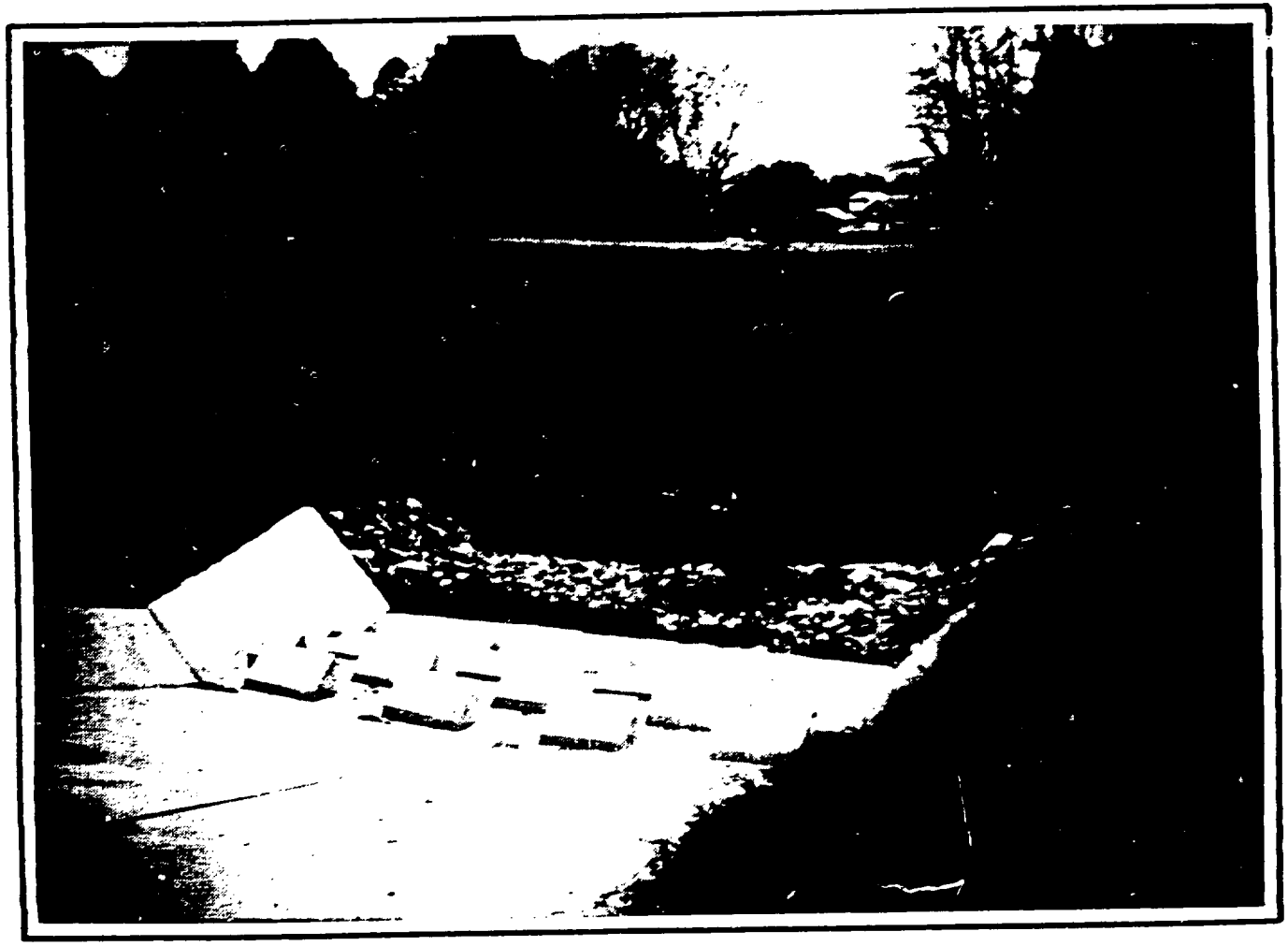


LEFT SPILLWAY WALL SHOWING CRACK AND LEACHATE DEPOSITS.

PHOTOGRAPH 3

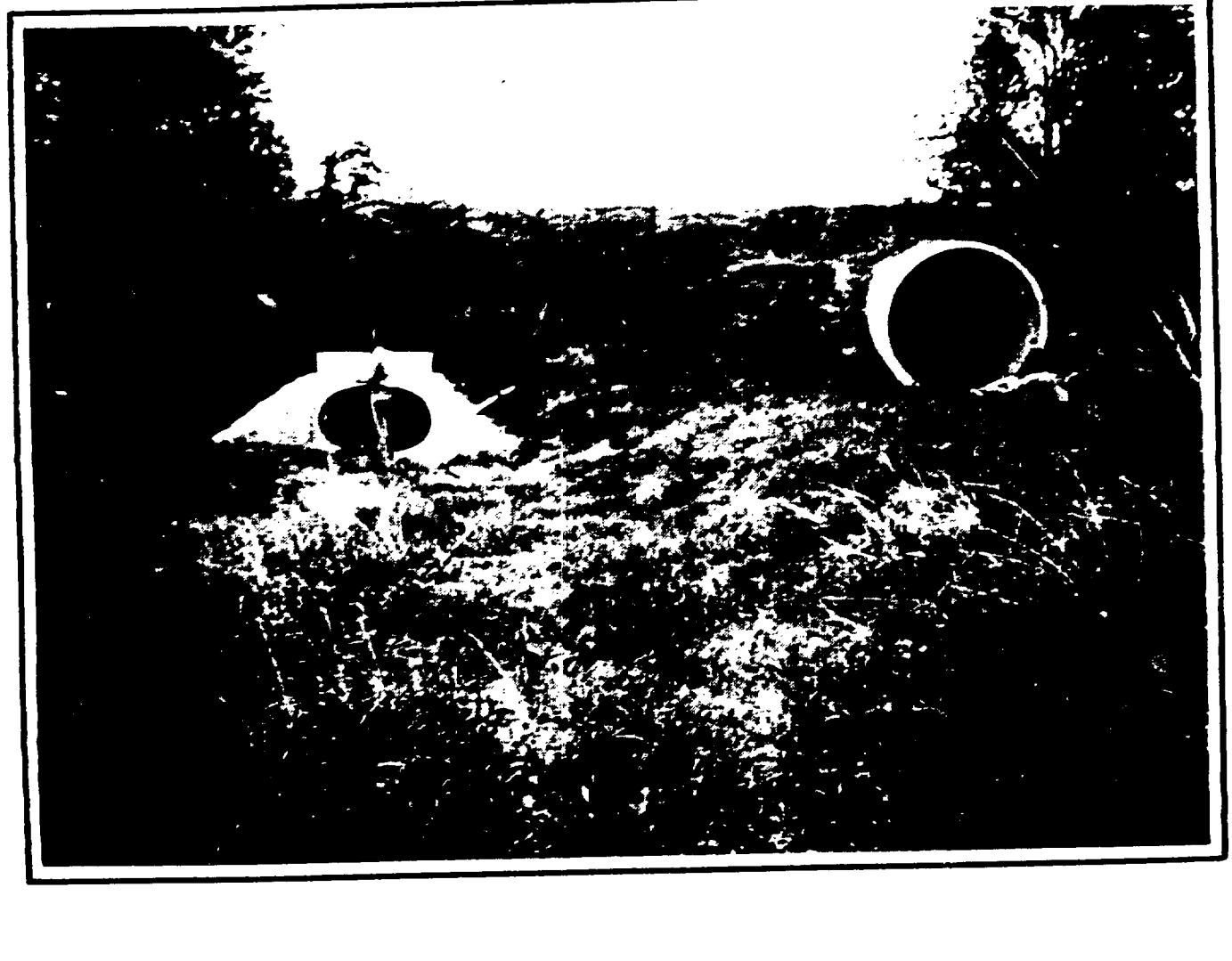


ONE OF FIVE DRAINS NEAR JUNCTION OF CHUTE AND STILLING BASIN
WITH AN ACCUMULATION OF CRUSHED STONE.



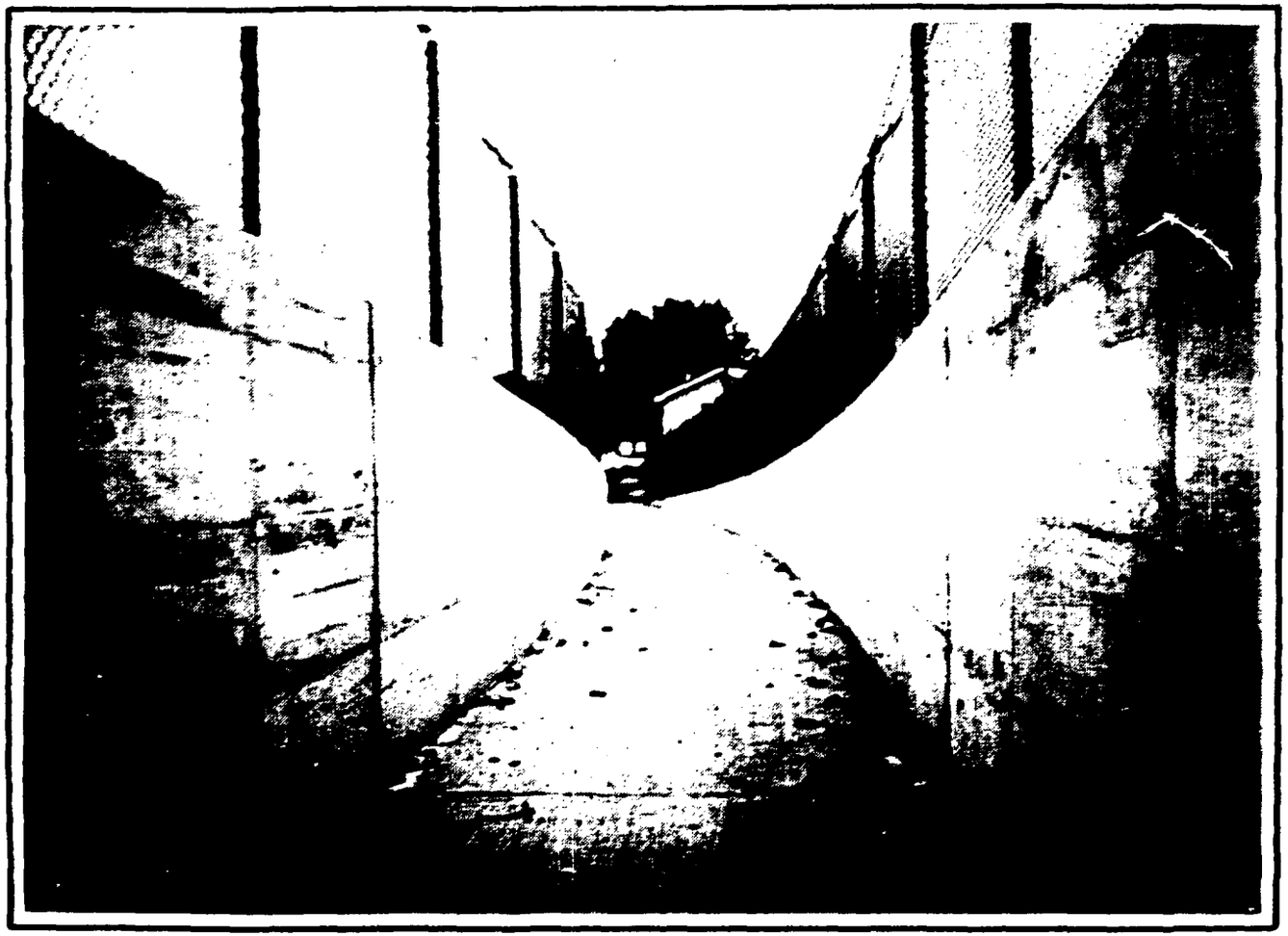
VIEW OF SPILLWAY SHOWING CHANNEL
TO PROPOSED WEST WYOMISSING AVENUE.
LOW FLOWS ENTER STORM SEWER VIA LEFT CULVERT.

PHOTOGRAPH 5



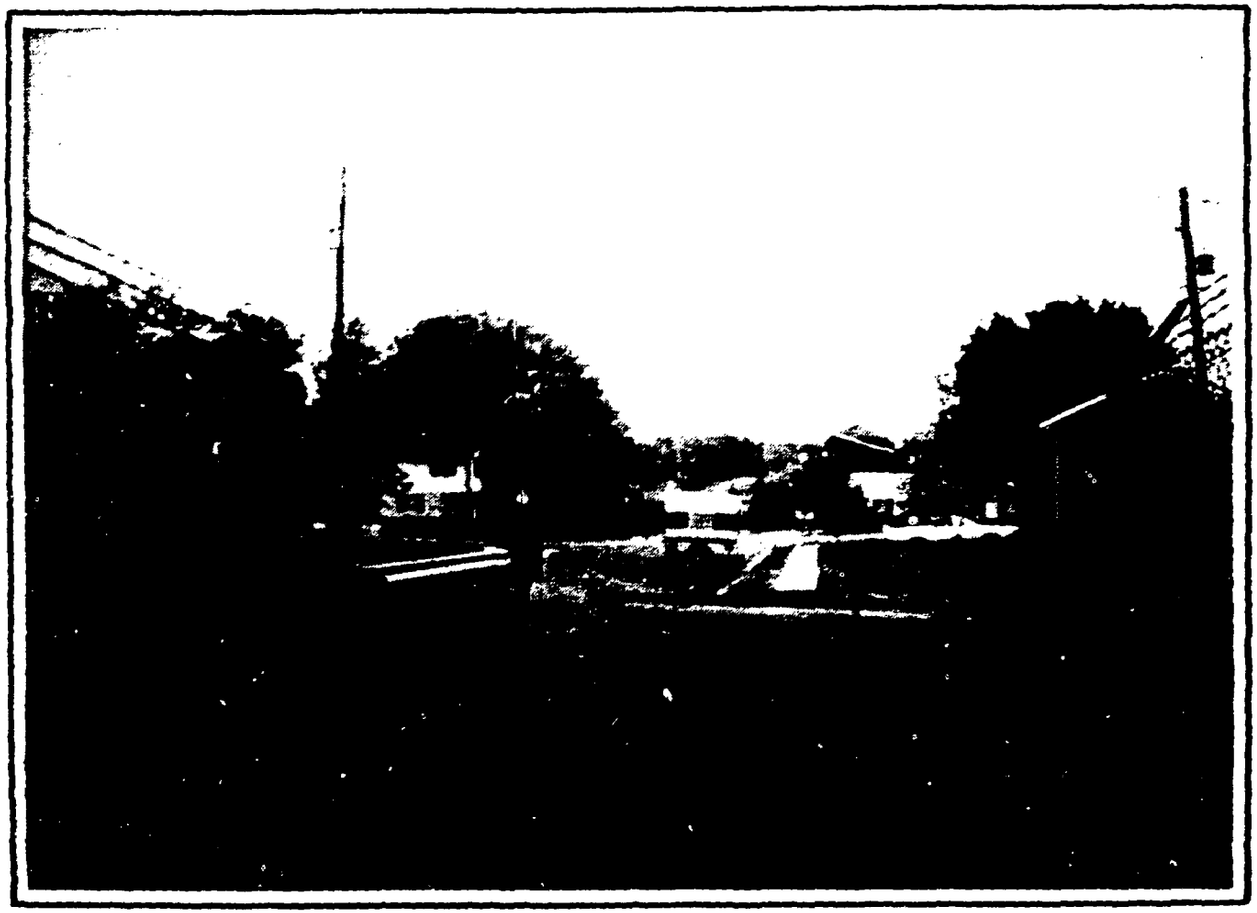
WEST WYOMISSING AVENUE EMBANKMENT.

PHOTOGRAPH 6



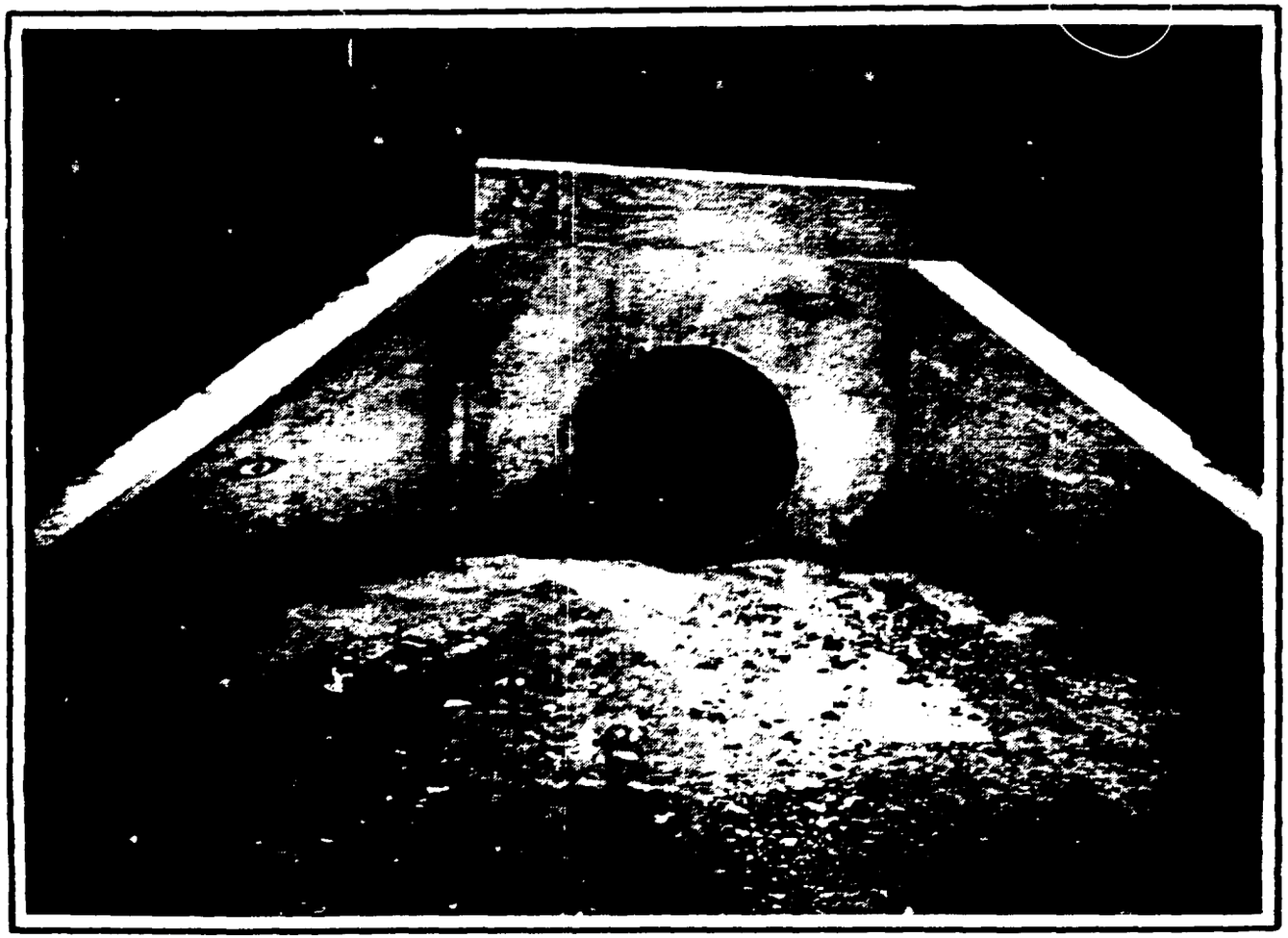
CHUTE DOWNSTREAM OF WEST WYOMISSING AVENUE.

PHOTOGRAPH 7



VIEW FROM DOWNSTREAM END OF CHUTE.

PHOTOGRAPH 8



LOW FLOW INLET FROM RESERVOIR DISCHARGES TO STORM SEWER SYSTEM.

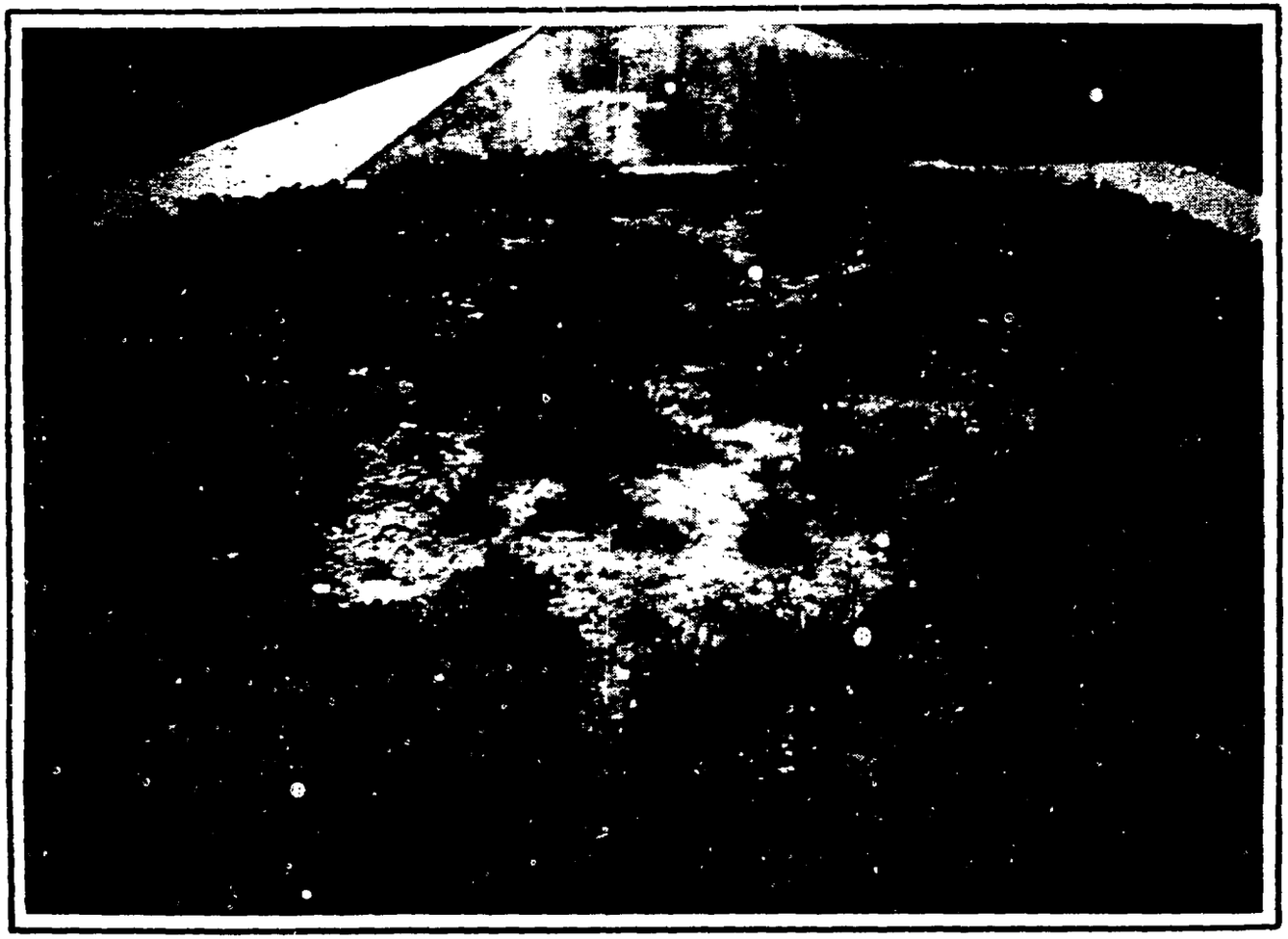
PHOTOGRAPH 9

UPSTREAM EMBANKMENT SLOPE, STAFF GAGE AND
PAVED CHANNEL TO LOW FLOW OUTLET.

PHOTOGRAPH 10

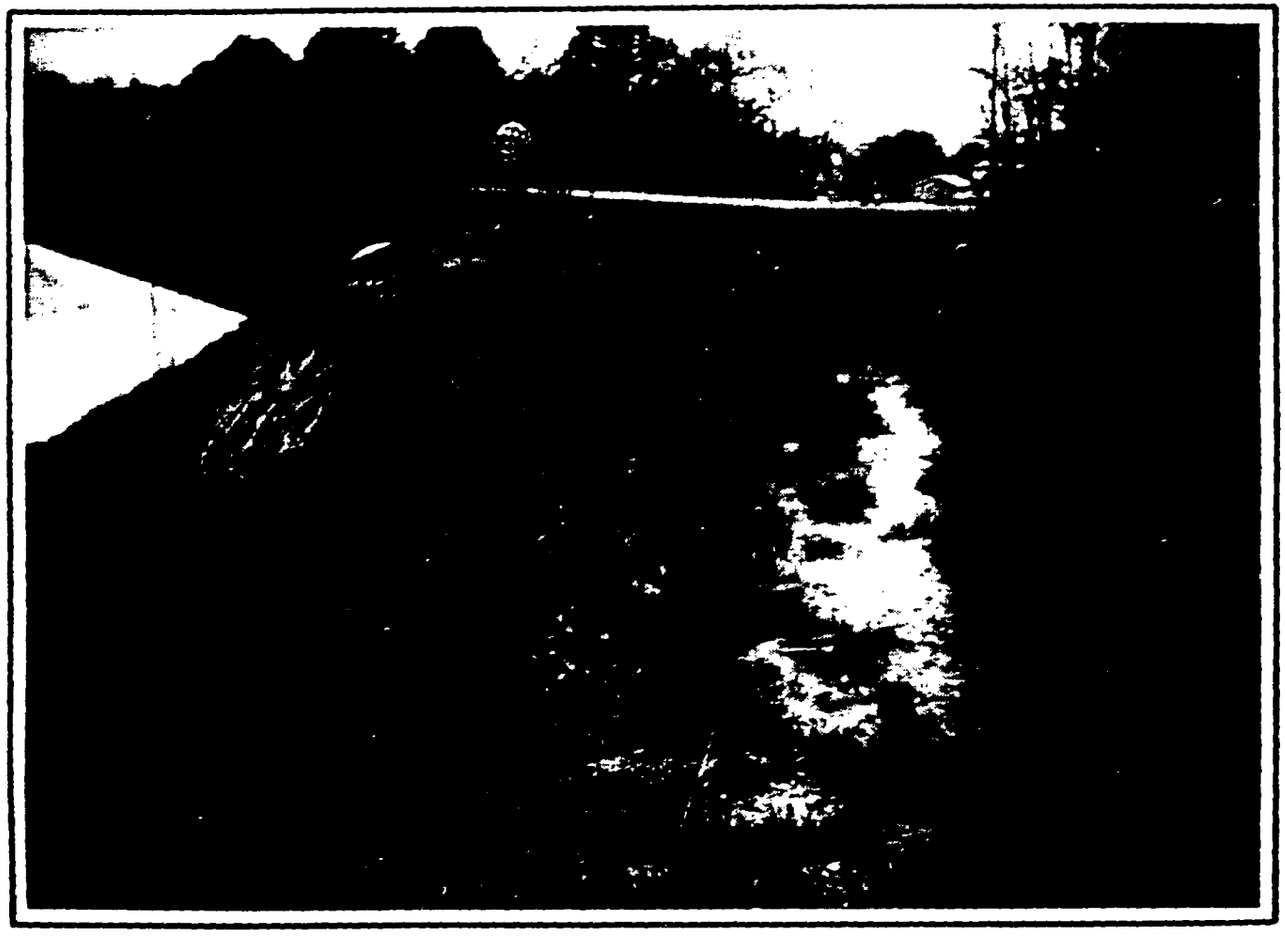
OVERALL VIEW OF EMBANKMENT CREST.

PHOTOGRAPH 11



EMBANKMENT CREST NEAR SPILLWAY.

PHOTOGRAPH 12

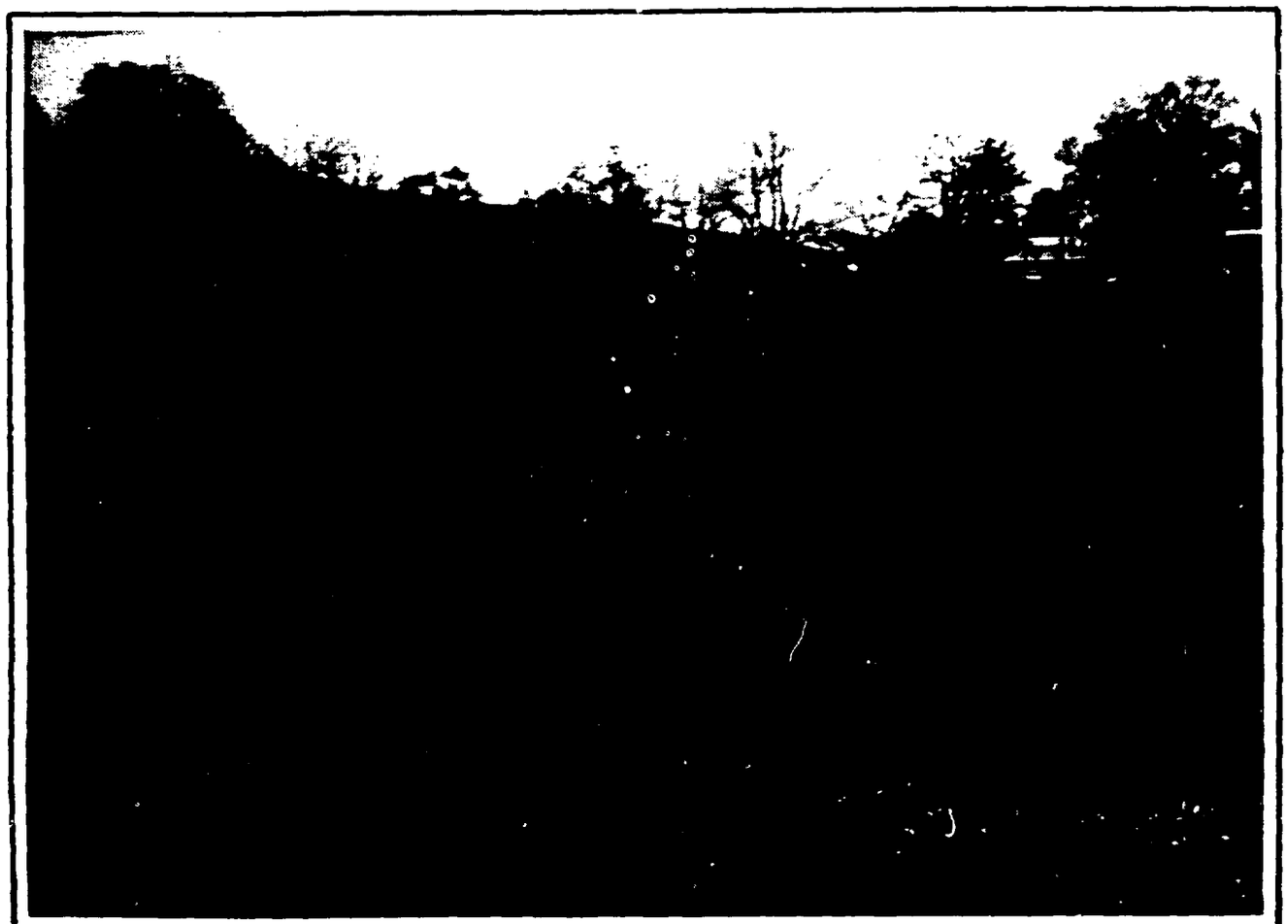


CREST OF SPUR DIKE.

PHOTOGRAPH 13

DOWNSTREAM FACE OF SPUR DIKE.

PHOTOGRAPH 14



OVERALL VIEW OF DOWNSTREAM EMBANKMENT.

PHOTOGRAPH 15

EROSION GULLIES AT LEFT DOWNSTREAM
JUNCTION BETWEEN EMBANKMENT AND ABUTMENT.

PHOTOGRAPH 16

APPENDIX

D

STANFORD AVENUE STORMWATER RETENTION POND

CHECK LIST HYDROLOGIC AND HYDRAULIC ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: *About 40% wooded 25% residential development*

ELEVATION NORMAL POOL (STORAGE CAPACITY): *Reservoir is normally dry*

ELEVATION TOP FLOOD CONTROL POOL (STORAGE CAPACITY): *359.0 feet (135 acre-feet)*

ELEVATION MAXIMUM DESIGN POOL: -

ELEVATION TOP DAM: *359.0 feet*

SPILLWAY

a. Elevation *352.9 feet*

b. Type *Concrete chute spillway*

c. Width *31.5 feet*

d. Length *150 feet*

e. Location Spillover *Approximately 275 feet from left abutment*

f. Number and Type of Gates *none*

OUTLET WORKS:

a. Type *36-inch RCP*

b. Location *Approximately 250 feet from left abutment*

c. Entrance inverts *333.0 feet*

d. Exit inverts *The 36-inch pipe discharges into storm sewer system*

e. Emergency draindown facilities *none*

HYDROMETEOROLOGICAL GAGES:

a. Type *none*

b. Location *N/A*

c. Records *N/A*

MAXIMUM NON-DAMAGING DISCHARGE: *Not determined*

" All elevations referenced to mean sea level. "

BY MFB DATE 6/11/81 SUBJECT Stanford Ave. Dam SHEET 2 OF 8

CHKD. BY REM DATE 6/23/81 Hydrology / Hydraulics JOB No.

Drainage Area 0.69 sq. miles, measured from USGS maps

Probable Maximum Precipitation - ref Hydrometerological Report No 33, Figs. 1 & 2

Index Rainfall - 29.5 inches, 10 sq miles, 24 hours

Adjustment Factors For Drainage Area

Zone	6
6 hr	113%
12 hr	129%
24 hr	139%
48 hr	142%

Snyder Hydrograph Parameters - ref. Information received from Corps of Engineers, Baltimore District

Zone	6
C_p	0.4
C_t	1.35
L	2.04 miles - length of longest water course from outlet to basin divide
L_{ca}	1.23 miles - length of water course from outlet to point opposite the centroid of drainage area (Plate 1, Appendix E)

$t_p = C_t (L \cdot L_{ca})^{0.3} = 1.28$

Spillway Capacity at Maximum Water Level

1950 cfs - see sheet 5

HEC-1, REVISED
FLOOD HYDROGRAPH PACKAGE

The original "Flood Hydrograph Package" (HEC-1), developed by the Hydrologic Engineering Center, Corps of Engineers, has been modified for use under the National Dam Inspection Program. The "Flood Hydrograph Package (HEC-1), Dam Safety Version", hereinafter referred to as, HEC-1, Rev., has been modified to require less detailed input and to include a dam breach analysis. The required input is obtained from the field inspection of a dam, any available design/evaluation data, relatively simple hydraulic calculations, or information from the USGS Quandrangle maps. The input format is flexible in order to reflect any unique characteristics of an individual dam.

HEC-1, Rev. computes a reservoir inflow hydrograph based on individual watershed characteristics such as: area, percentage of impervious surface area, watershed shape, and hydrograph characteristics determined from regional correlation studies by the Corps of Engineers, Baltimore District. The inflow is routed through the reservoir using spillway discharge data obtained from the field inspection or design data. Flood storage capacity is determined from USGS maps or design information and verified by the field inspection. In the event a spillway cannot discharge 0.5 PMF without overtopping and failure of the dam, downstream channel characteristics obtained from the field inspection and USGS maps are inputed and flows are routed downstream to the damage center and a dam breach analysis is performed. If the 100 year event is selected as the appropriate spillway design flood, the peak inflow value is correlated with other studies by adjusting hydrograph parameters.

Included in this Appendix are the HEC-1, Rev. pertinent input values and a summary print-out tables.

BY MEB DATE 6/11/81 SUBJECT Stanford Ave. Dam Hydrology / Hydraulics SHEET 4 OF 8
CHKD. BY REM DATE 6/23/81 JOB No.

Classification (Ref. Recommended Guidelines for Safety Inspection of Dams)

1. The hazard potential classification is "High" as there would be excessive economic loss and the potential for loss of life in the event of failure.

2. The size classification is "Small" based on its 27-Ft height and maximum reservoir capacity of 135 Ac-Ft

3. The selected spillway design flood, based on size and hazard classification, is 0.5PMF (Probable Maximum Flood).

Hydrology and Hydraulic Analysis

1. Original Data - Calculations in the Township Engineer's files.
   a. Spillway capacity
   $Q = CLH^{3/2}$
   where $L = 32$ Ft
   $C = 3.3$
   $H = 3$ Ft
   $Q = 32 \cdot 3.3 \cdot 3^{3/2}$
   $= 548.7$ cfs

   b. Inflow hydrograph of 50-yr, 3-hr event through an upstream Wilson Townhouse detention basin (not shown on Plate 1, Appendix E) and combined with runoff from the intervening watershed produced a peak inflow of 563 cfs. Routing through the Stanford Ave. Reservoir produced a peak outflow of 160 cfs.

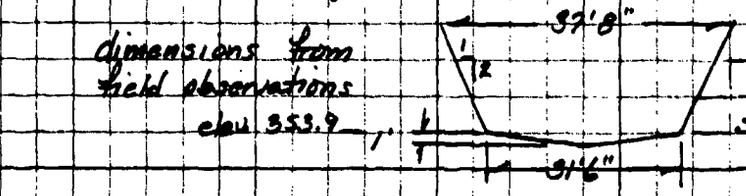
   Drainage Area = 6.42 Ac
   Capacity of Storm Sewer System - 190 cfs
   Ref. Gannett Fleming Corddry & Carpenter's 1976 report

2. Evaluation Data

   a. Drainage Area - the area shown on Plate 1, Appendix E, measures about 401 Ac < 642 Ac. As the GFC&C value may be based on more accurate maps or may include other areas as a result of storm sewers, the larger value will be used.

b. Other inflow hydrograph parameters are shown on sheet 2. Peak 0.5 PMF value is 1041 cfs, sheet 8.

c. Elevation - discharge data -



Assume friction and entrance losses are negligible, depth of water at channel entrance is d_c (critical depth) and depth of water is reservoir is $d_c + v_c^2/2g$.
Ref: Brater & King, Handbook of Hydraulics, 19??

$$v_c = \sqrt{g d_m} \quad \text{where } d_m = \frac{a}{T}$$

a = area
T = top width

$$Q_c = a \cdot v_c$$

If water in channel is at elev. 352.2

$T = 31.5 + 3.3 = 34.8$ ft

$a = 31.5 \cdot \frac{1}{2} \cdot 1 + \frac{1}{2}(31.5 + 34.8) 3.3 = 125.1$ ft^2

$v_c = \sqrt{g \cdot 125.4/34.8} = 10.8$ ft/sec

$Q_c = 125.1 \cdot 10.8 = 1351$ cfs

Water surface in reservoir

$352.2 + \frac{10.8^2}{2g} = 359$ ft = 359 ft. the min. crest elev.

d. Spillway Adequacy - as the max. spillway capacity is greater than the peak inflow during the spillway design flood, the spillway is considered "Adequate".

e. Reservoir Volume was estimated from areas measured from Plate 2, Appendix E. Actual geometry may differ as a result of rock uncovered during construction.

333 ft	0 Ac.	0 Ac-Ft	345 ft	4.3 Ac.	34.4 Ac-Ft	360 ft	9.2 Ac.		
335 ft	1.6 Ac.	1.6 Ac-Ft	350 ft	7.1 Ac.	62.8 Ac-Ft			144.0 Ac-Ft.	
340 ft.	3.6 Ac.	14.6 Ac-Ft	355 ft	8.1 Ac.	100.7 Ac-Ft				

```
1**********************************
 FLOOD HYDROGRAPH PACKAGE (HEC-1)
 DAM SAFETY VERSION      JULY 1978
   LAST MODIFICATION  01 APR 80
 **********************************
    1                A1       STANFORD AVENUE STORMWATER DETENTION POND
    2                A2                NDI PA 01140  DER NO. 6-467
    3                A3                        OVERTOPPING ANALYSIS
    4                B    150        0       20        0        0        0        0        0       -4        0
    5                B1     5
    6                J      1        1        1
    7                J1  .5
    8                K      0      IN                                                  1
    9                K1       INFLOW HYDROGRAPH
   10                M      1        1  1.0                                                                  1
   11                P       23.5    113.    123.    132.    142.
   12                T                                                        .5       .05
   13                W  1.78 .4
   14                X  -1.5 -.05    2.
   15                K     99
```

8 of 21

PREVIEW OF SEQUENCE OF STREAM NETWORK CALCULATIONS

RUNOFF HYDROGRAPH AT IN
END OF NETWORK

1**********
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION JULY 1978
LAST MODIFICATION 01 APR 80
****

RUN DATE= 81/06/11.
TIME= 08.19.00.

STANFORD AVENUE STORMWATER DETENTION POND
NDI PA 01140 DER NO. 6-467
OVERTOPPING ANALYSIS

JOB SPECIFICATION

NQ	NHR	NMIN	IDAY	IHR	IMIN	METRC	IPLT	IPRT	NSTAN
150	0	20	0	0	0	0	0	-4	0
			JOPER	NUT	LROPT	ITRACE			
			5	0	0	0			

MULTI-PLAN ANALYSES TO BE PERFORMED
NPLAN= 1 NRTIO= 1 LRTIO= 1

RTIOS= .50

SH 6 OF 8

SUB-AREA RUNOFF COMPUTATION

INFLOW HYDROGRAPH

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
IN	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	1.00	0.00	1.00	0.00	0.000	0	1	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	23.50	113.00	123.00	132.00	142.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS .800

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	.50	.05	0.00	0.00

UNIT HYDROGRAPH DATA

TP= 1.78 CP= .40 NTA= 0

RECESSION DATA

STRTQ= -1.50 QRCSN= -.05 RTIOR= 2.00

UNIT HYDROGRAPH 56 END-OF-PERIOD ORDINATES, LAG= 1.77 HOURS, CP= .40 VOL= 1.00

10.	37.	75.	113.	138.	145.	135.	122.	111.	100.
90.	82.	74.	67.	61.	55.	50.	45.	41.	37.
33.	30.	27.	25.	22.	20.	18.	16.	15.	14.
12.	11.	10.	9.	8.	7.	7.	6.	5.	5.
4.	4.	4.	3.	3.	3.	2.	2.	2.	2.
2.	1.	1.	1.	1.	1.				

0

END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
									SUM	26.70	24.71	1.99	45167.
										(678.)	(628.)	(51.)	(1278.99)

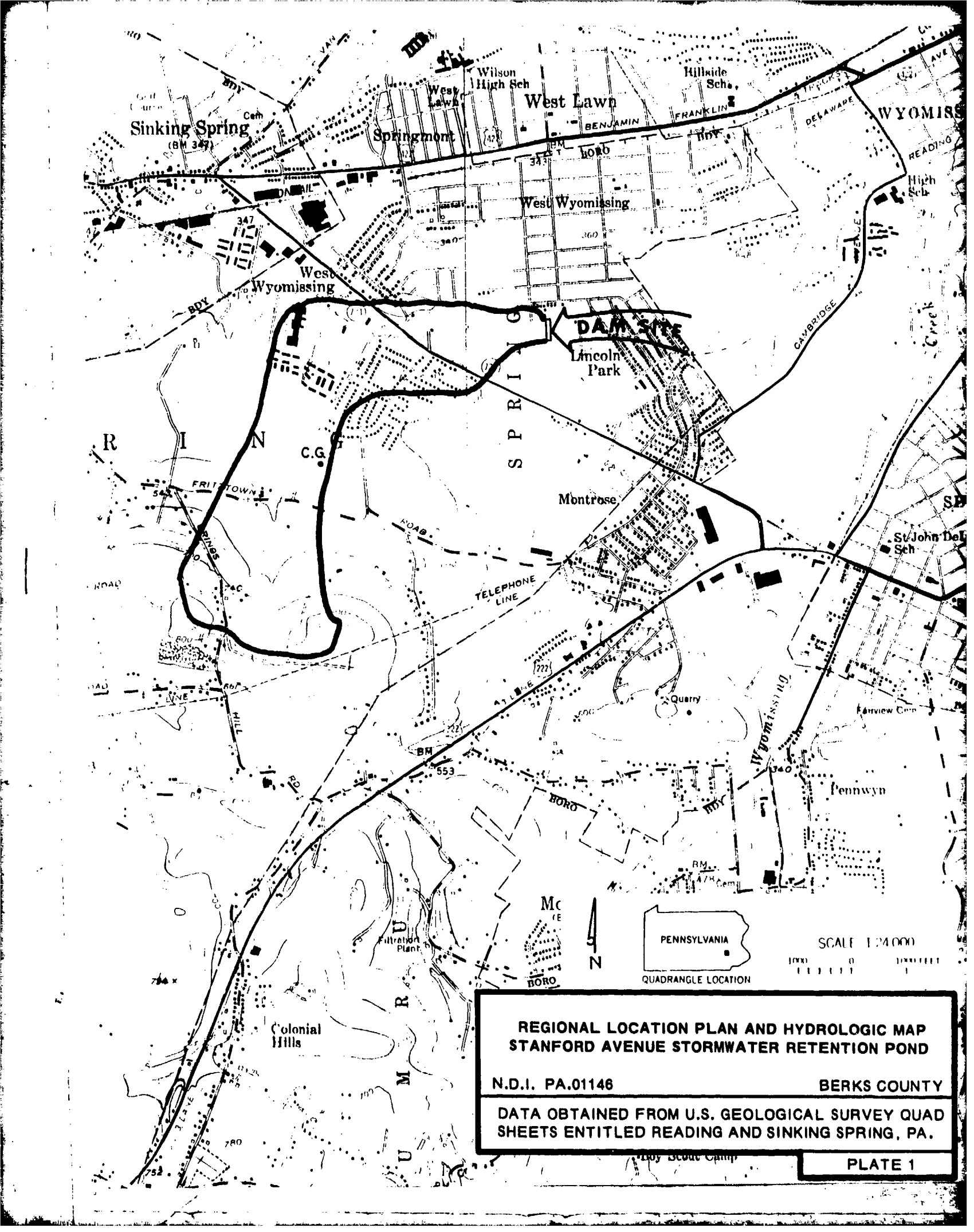
SH. 7 OF 8

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIO APPLIED TO FLOWS 1 .50
HYDROGRAPH AT	IN	1.00 (2.59)	1	1041. (29.47)

APPENDIX

E

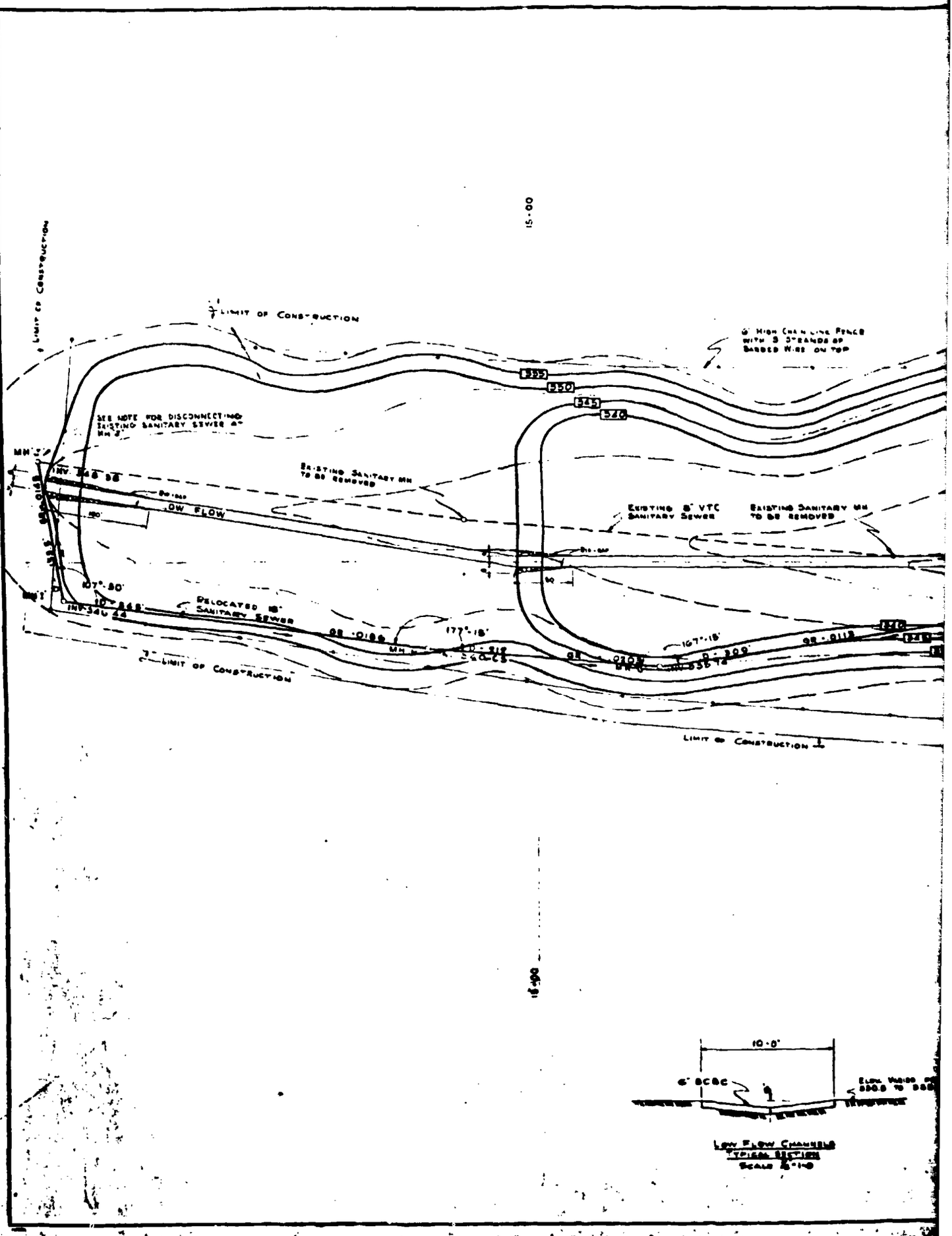


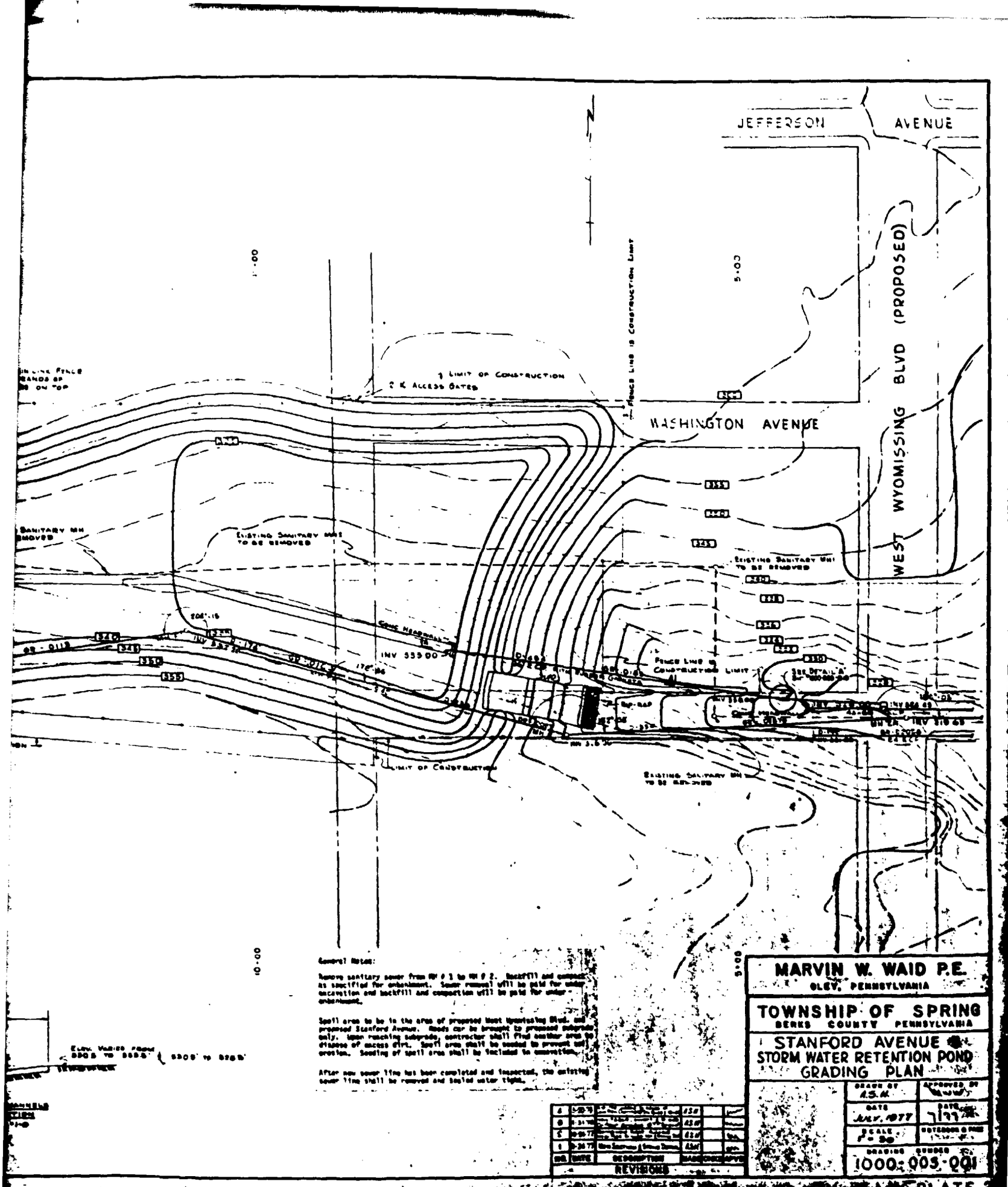
REGIONAL LOCATION PLAN AND HYDROLOGIC MAP
STANFORD AVENUE STORMWATER RETENTION POND

N.D.I. PA.01146 **BERKS COUNTY**

DATA OBTAINED FROM U.S. GEOLOGICAL SURVEY QUAD SHEETS ENTITLED READING AND SINKING SPRING, PA.

PLATE 1


LIMIT OF CONSTRUCTION
6' HIGH CHAIN LINK FENCE WITH 3 STRANDS OF BARBED WIRE ON TOP
SEE NOTE FOR DISCONNECTING EXISTING SANITARY SEWER AT MH 2
EXISTING SANITARY MH TO BE REMOVED
EXISTING 8" VTC SANITARY SEWER
EXISTING SANITARY MH TO BE REMOVED
FLOW
RELOCATED 18" SANITARY SEWER
107°-30'
177°-15'
167°-15'
LIMIT OF CONSTRUCTION
LIMIT OF CONSTRUCTION
10'-0"
6" BCBC
LOW FLOW CHANNELS
TYPICAL SECTION



General Notes:

Remove sanitary sewer from MH # 1 to MH # 2. Backfill and compact as specified for embankment. Sewer removal will be paid for under excavation and backfill and compaction will be paid for under embankment.

Spoil area to be in the area of proposed West Wyomissing Blvd. and proposed Stanford Avenue. Roads can be brought to proposed subgrade only. Upon reaching subgrade, contractor shall find another area to dispose of excess dirt. Spoil area shall be seeded to prevent soil erosion. Seeding of spoil area shall be included in construction.

After new sewer line has been completed and inspected, the existing sewer line shall be removed and sealed water tight.

NO.	DATE	DESCRIPTION	APPROVED
A	5-20-77		
B	7-11-77		
C	9-19-77		
D	11-21-77		

REVISIONS

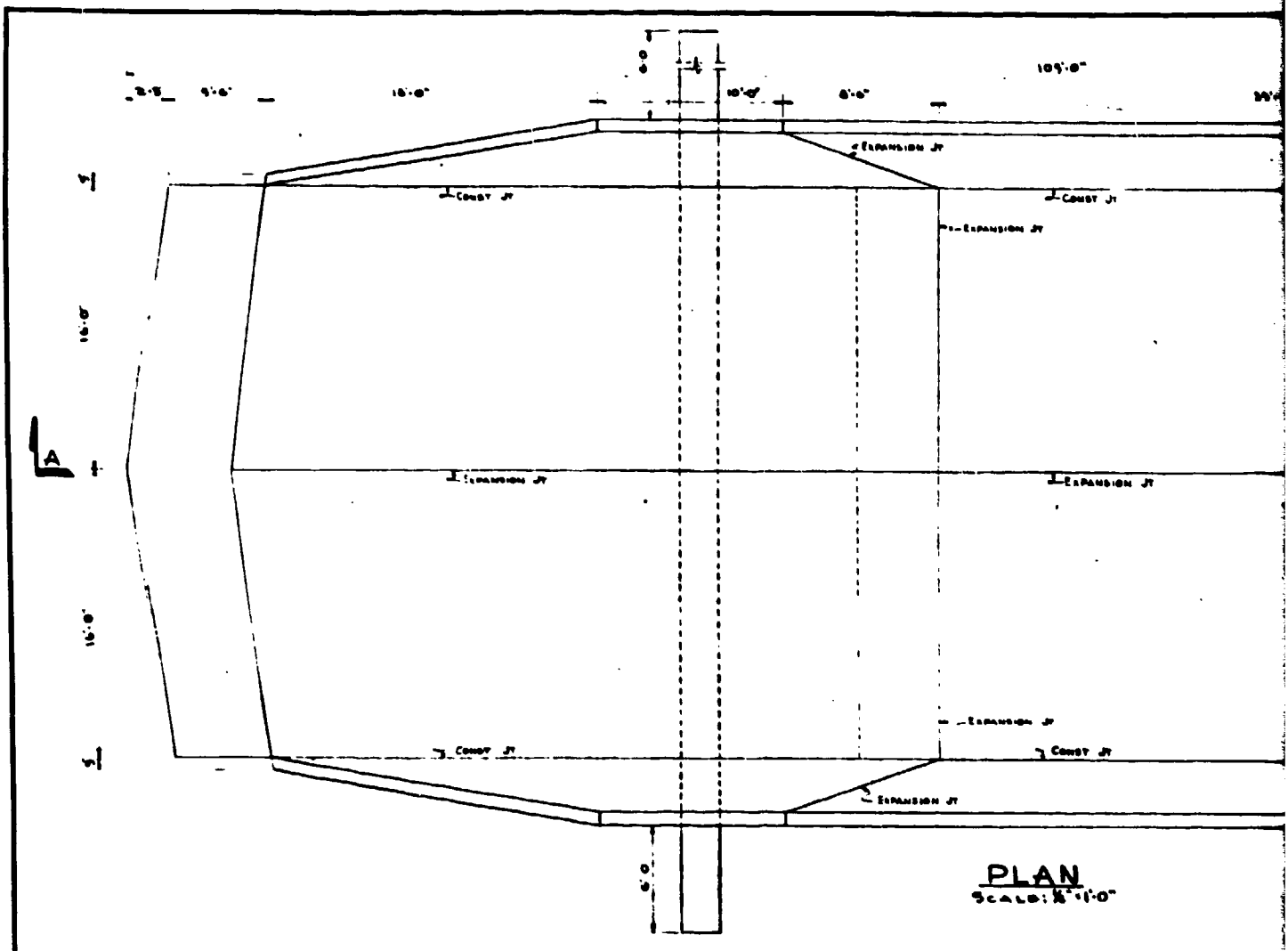
MARVIN W. WAID P.E.
OLEY, PENNSYLVANIA

TOWNSHIP OF SPRING
BERKS COUNTY PENNSYLVANIA

STANFORD AVENUE
STORM WATER RETENTION POND
GRADING PLAN

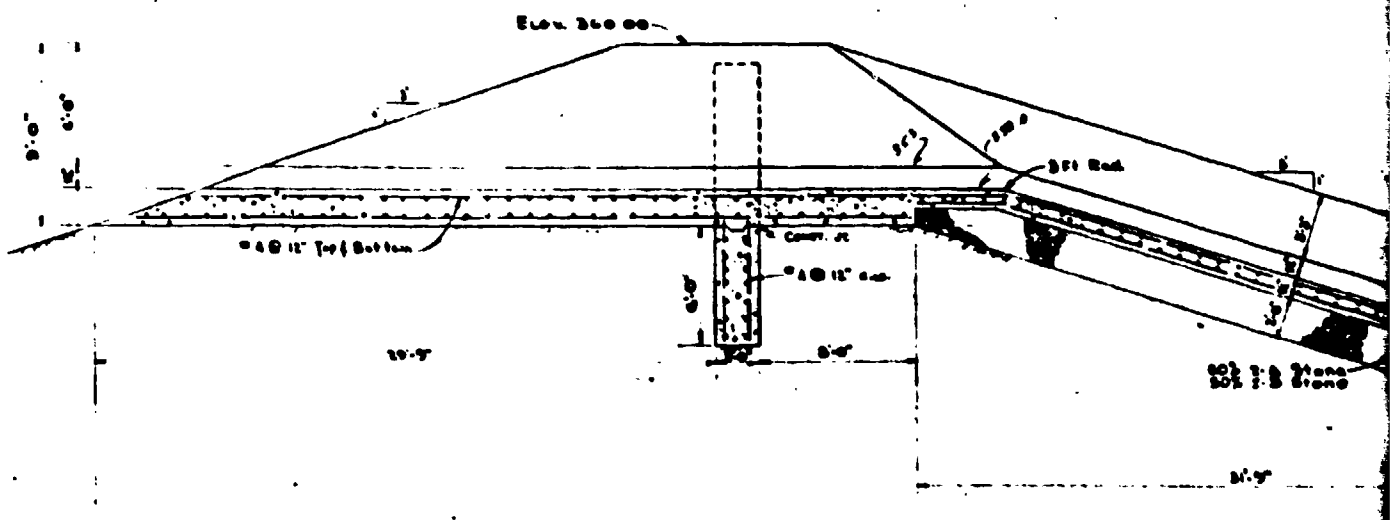
DRAWN BY: A.S.M.	APPROVED BY:
DATE: NOV. 1977	DATE: 7/77
SCALE: 1" = 50'	NOTEBOOK & PAGE:
DRAWING NUMBER: 1000-005-001	

PLATE



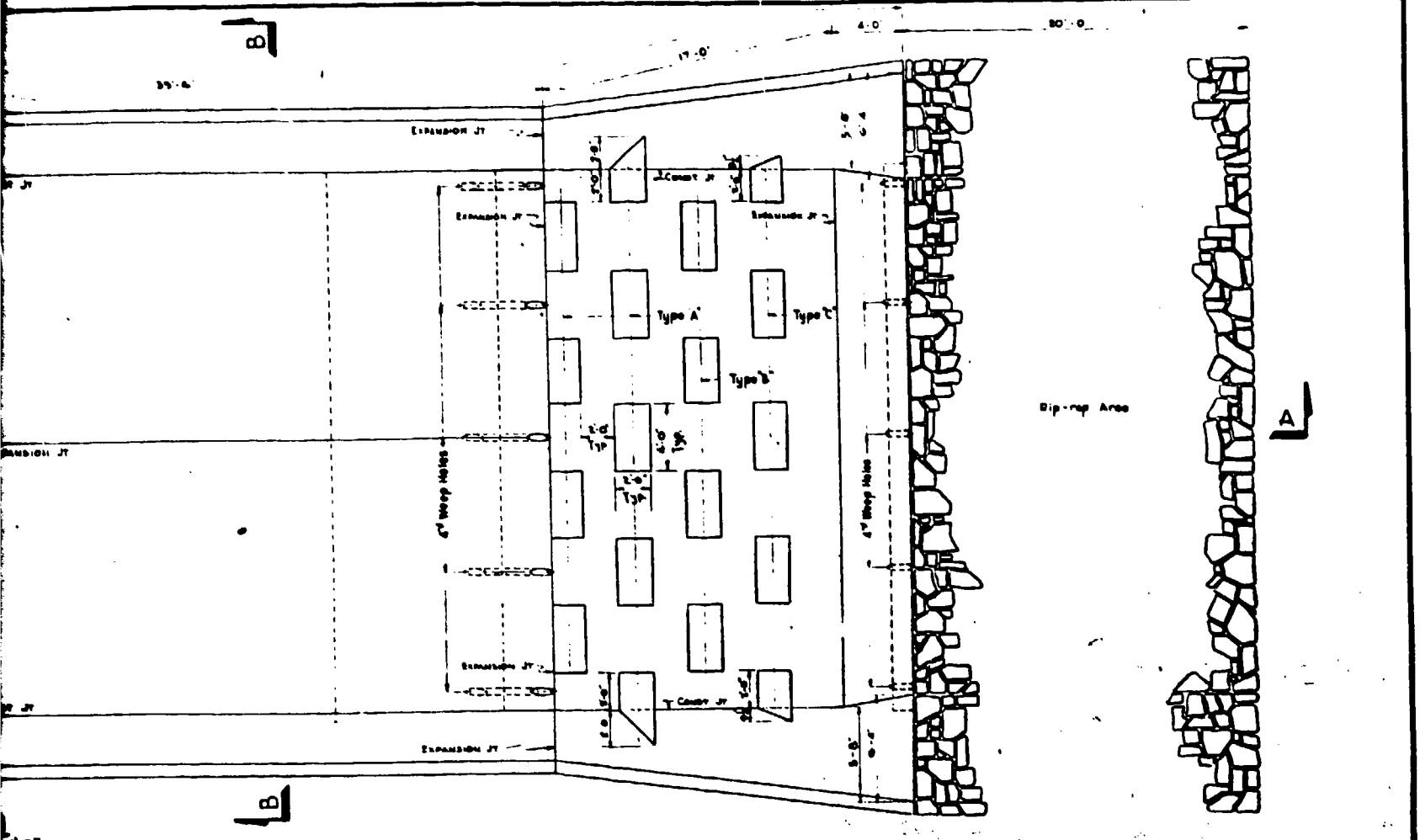
PLAN

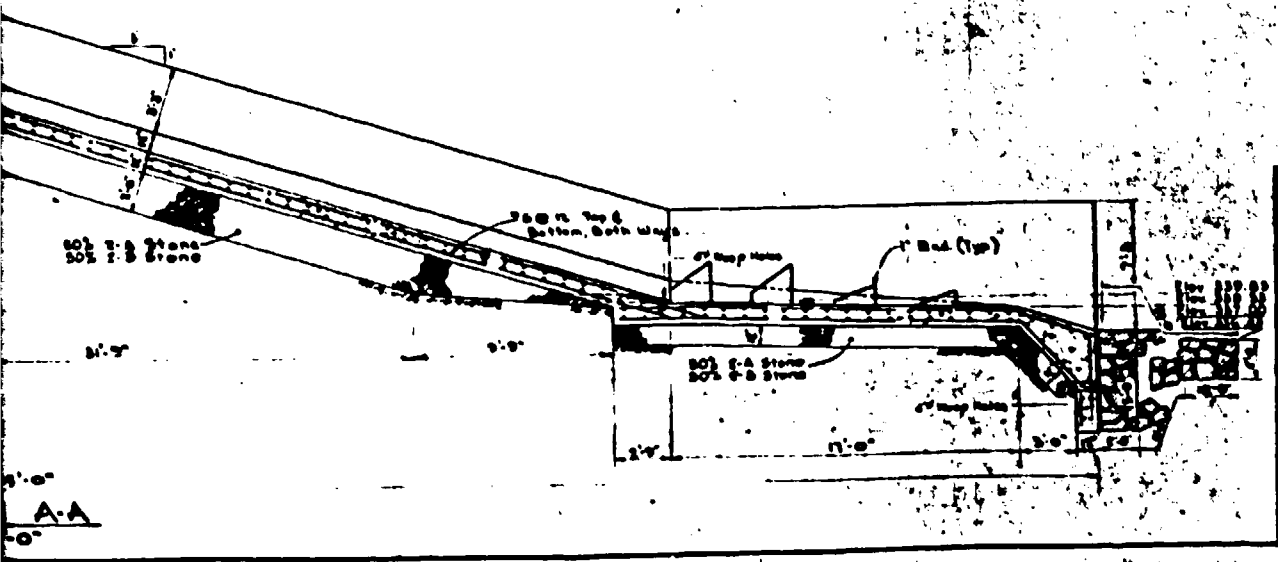
SCALE: 1/8"=1'-0"



SECTION A-A

SCALE: 1/8"=1'-0"





General Notes:
All concrete to be 3,750 PSI concrete
All reinforced steel to be 60,000 PSI

NO.	DATE	DESCRIPTION	BY
2	9-5-78		
1	9-21-78		

REVISIONS

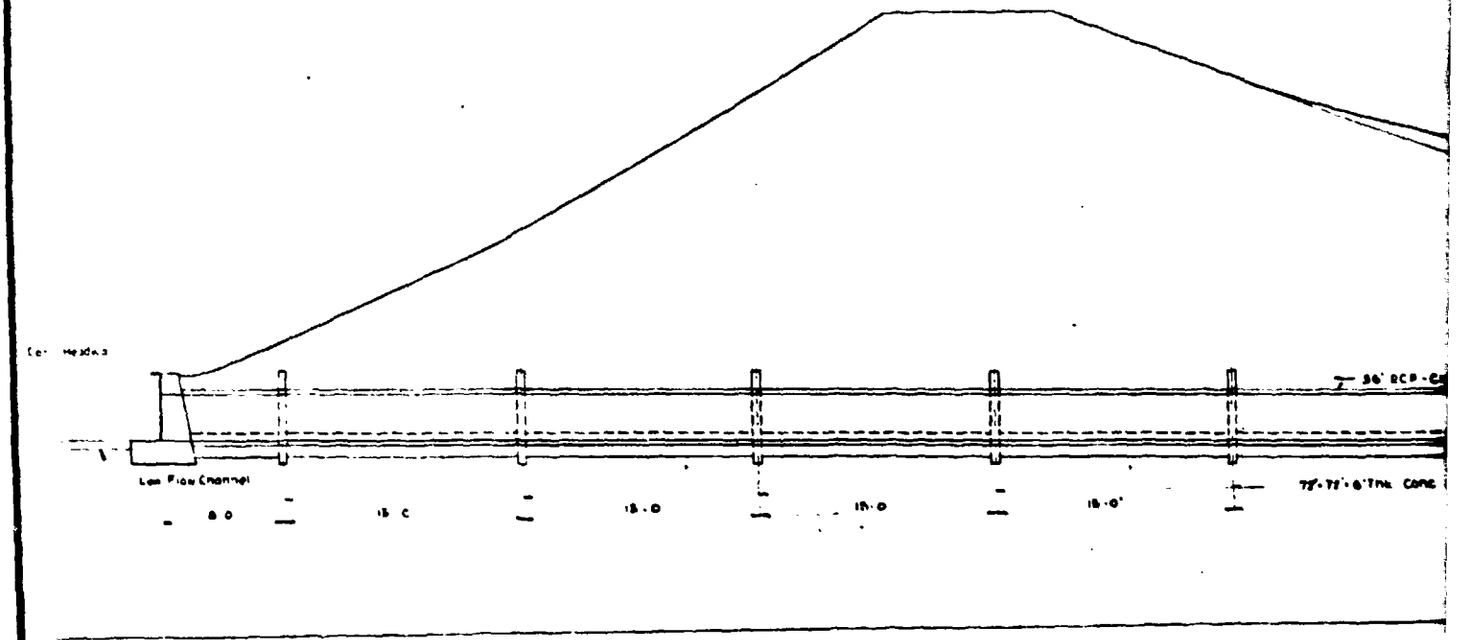
MARVIN W. WAID P.E.
OLEY, PENNSYLVANIA

TOWNSHIP OF SPRING
BERKS COUNTY PENNSYLVANIA

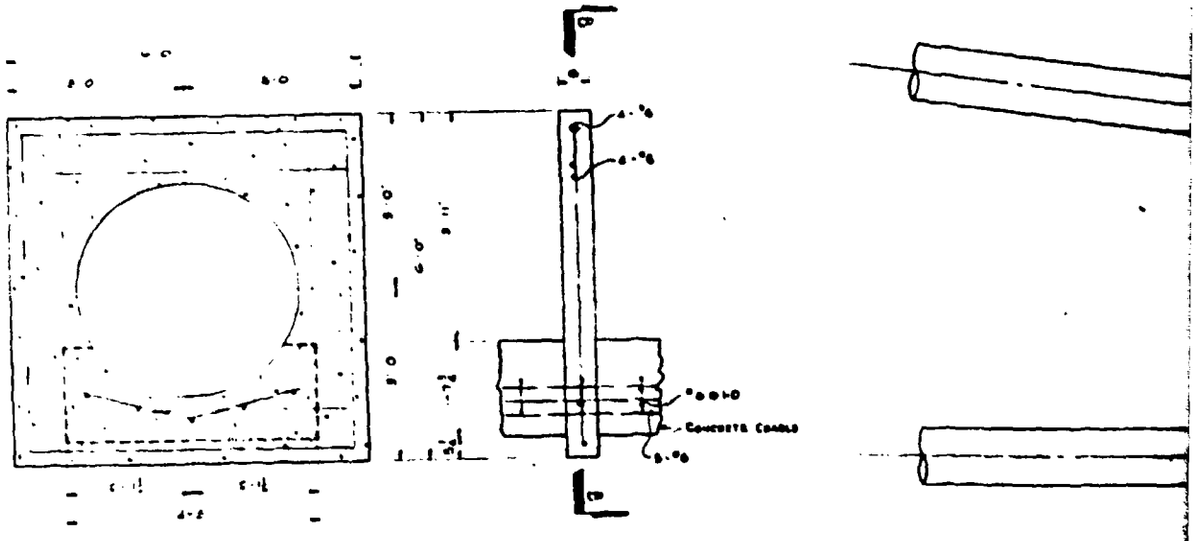
STANFORD AVENUE
STORM WATER RETENTION POND
SPILLWAY DETAILS

DRAWN BY G.S. DONALD	APPROVED BY R.W.W.
DATE JUNE, 1977	DATE 7/78
SCALE As Noted	NOTEBOOK & PAGE
DRAWING NUMBER 1000-005-005	

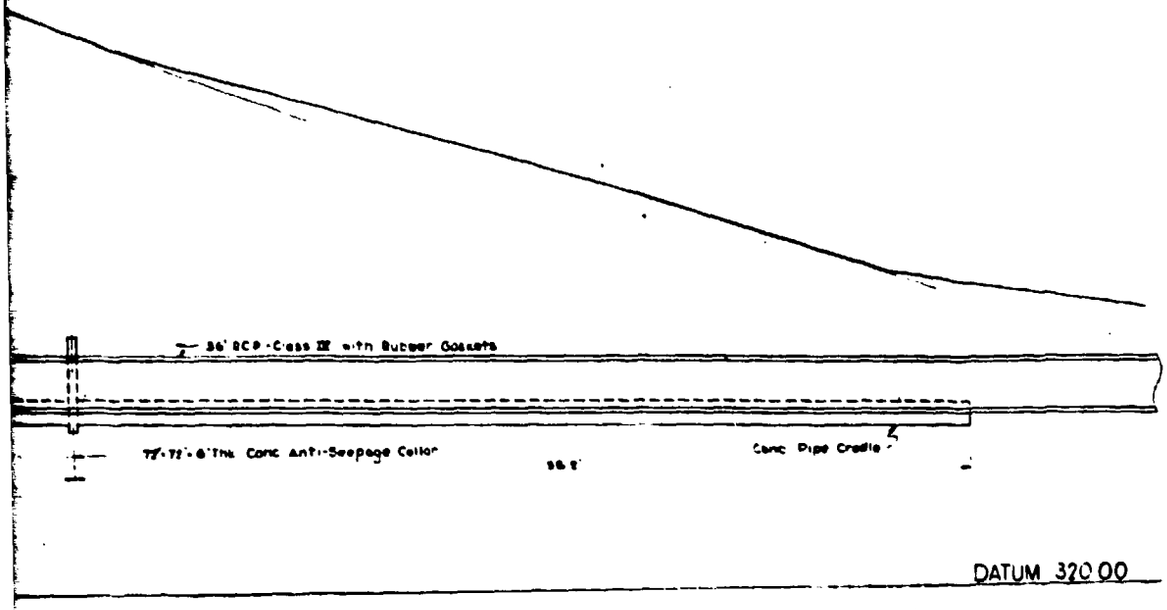
PLATE 3



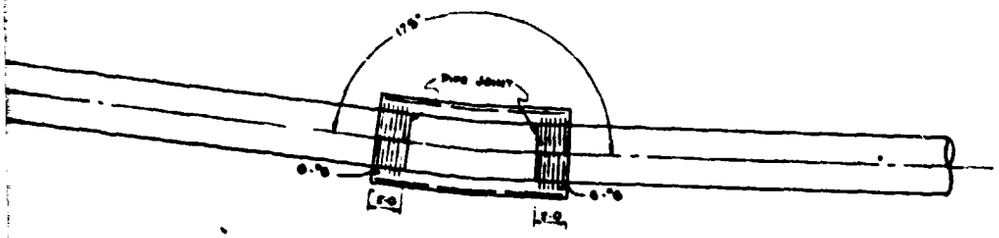
PROFILE (SECT
SCALE 1"=8'



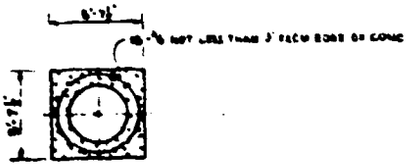
SEEPAGE COLLAR
SECTION B-B
SCALE 1/4"=1'0"



PROFILE (SECT A-A)
SCALE 1"=5'

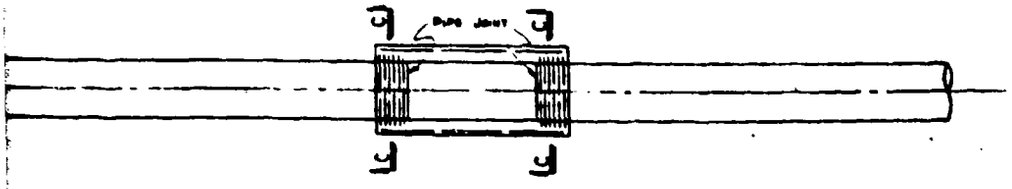


DETAIL 'A'
SCALE 1"=5'



SECTION C-C
SCALE 1"=5'

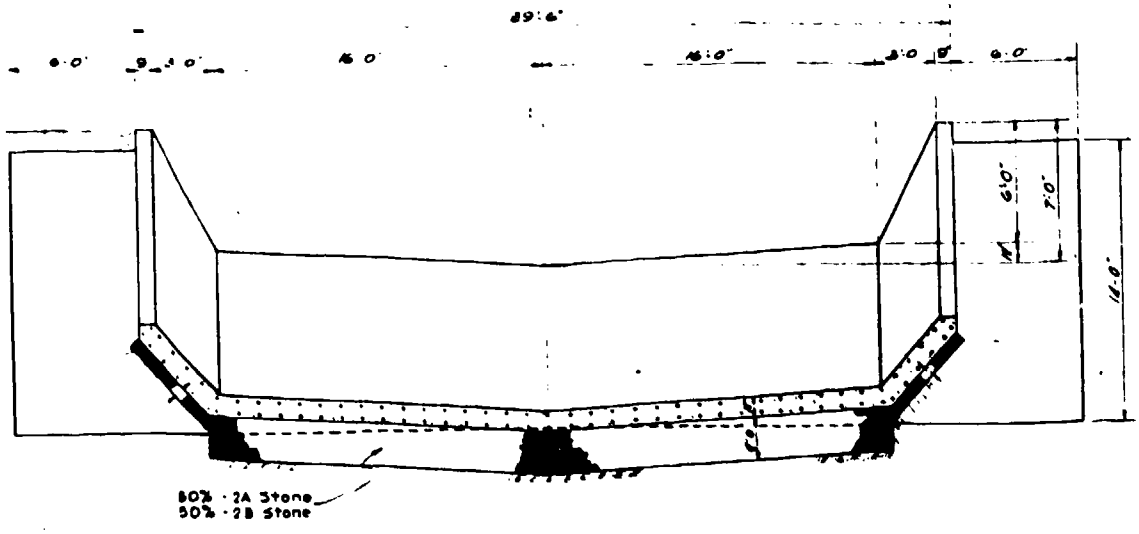
NOTE:
CONCRETE PIPE CRADLE & ANTI-SEEPAGE COLLAR WILL BE PAID FOR BY THE CUBIC YARD UNDER CONCRETE IN PLACE INCLUDING REINFORCEMENT Bid Item "B"



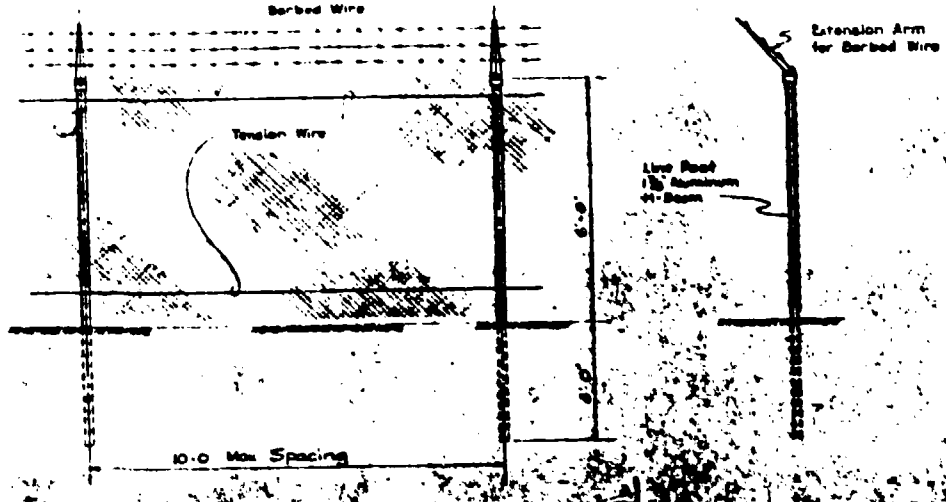
PROFILE
SCALE 1"=5'

MARVIN W. WAID P.E.	
OLEY, PENNSYLVANIA	
TOWNSHIP OF SPRING	
BERKS COUNTY PENNSYLVANIA	
STANFORD AVENUE STORM WATER RETENTION POND DISCHARGE DETAILS	
	DRAWN BY: ASH / APPROVED BY: MWW
	DATE: OCTOBER, 1977 / DATE: 10/77
	SCALE: AS NOTED / NOTEBOOK & PAGE
	DRAWING NUMBER: 1000-003-019

PLATE 4



SECTION B-B
SCALE ¼" = 1'-0"



CHAIN LINK FENCE
TYPICAL SECTION
SCALE ½" = 1'-0"

SECTION A-A
SCALE ½" = 1'-0"

ENERGY DISSIPATOR
TYPE A
SCALE ½"=1'-0"

ENERGY DISSIPATOR
TYPE B
SCALE ½"=1'-0"

ENERGY DISSIPATOR
TYPE C
SCALE ½"=1'-0"

SECTION C-C
SCALE ½"=1'-0"

SECTION E-E
SCALE ½"=1'-0"

SECTION G-G
SCALE ½"=1'-0"

SECTION D-D
SCALE ½"=1'-0"

SECTION F-F
SCALE ½"=1'-0"

SECTION H-H
SCALE ½"=1'-0"

CONSTRUCTION JOINT

EXPANSION JOINT

MARVIN W. WAID, P.E.
DUST, PENNSYLVANIA

TOWNSHIP OF SPRING
BERKS COUNTY PENNSYLVANIA

STANFORD AVENUE
STORM WATER RETENTION POND
SPILLWAY DETAILS

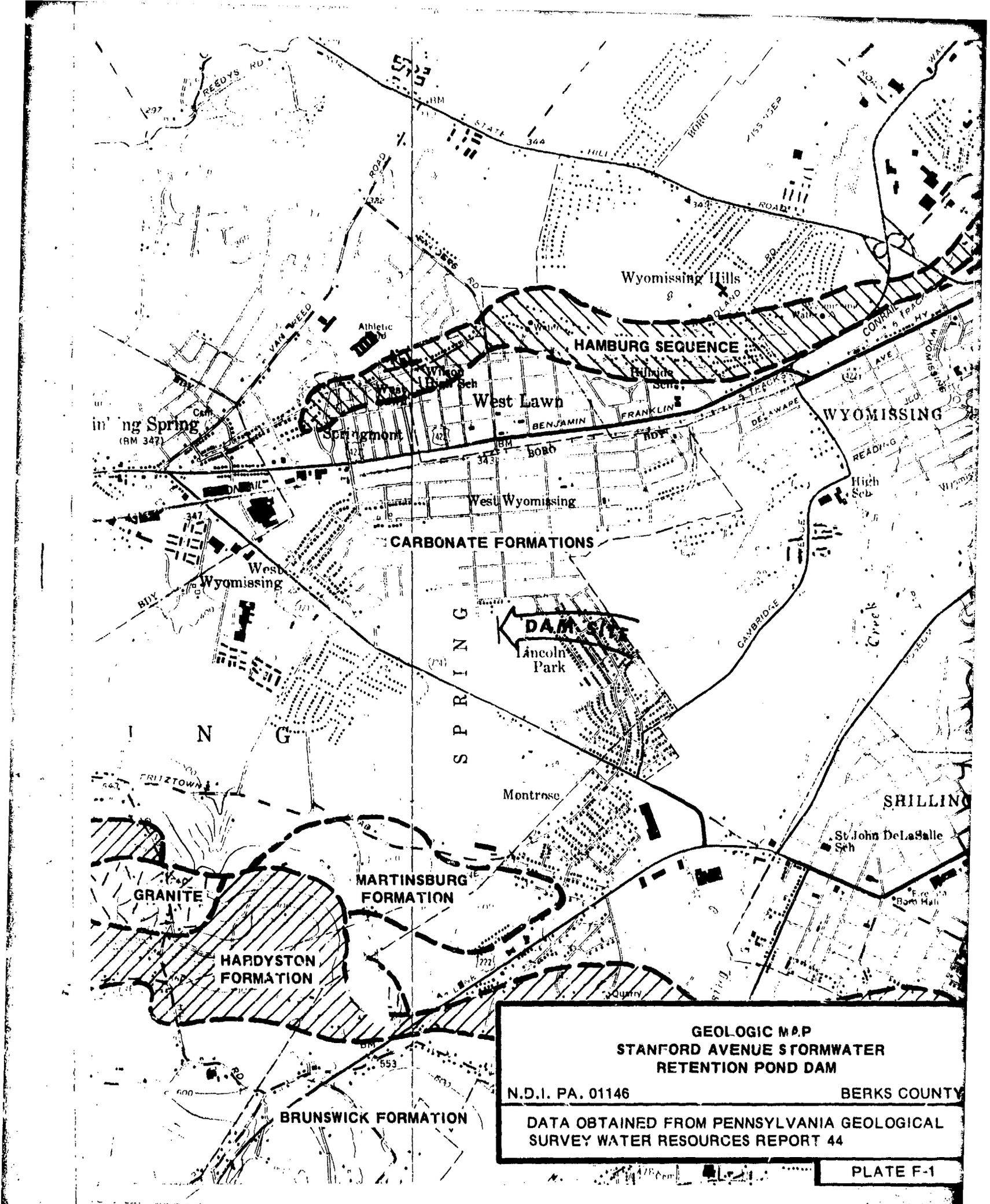
3000-003-005

APPENDIX

F

STANFORD AVENUE STORMWATER RETENTION POND
SITE GEOLOGY

Stanford Avenue Stormwater Retention Pond dam is located in the Great Valley section of the Valley and Ridge physiographic province. As shown in Plate F-1, the dam site and much of the surrounding areas are underlain by carbonate (limestone and dolomite) formations. The particular formation upon which the dam is constructed is the Millbach Formation which consists of interbedded limestone and dolomite. No bedrock was observed during the field inspection. Information contained in the Soil and Foundation Investigation data describes limestone bedrock as having been countered in test borings from depths of two to about 15 feet and with some badly broken zones.



GEOLOGIC MAP
STANFORD AVENUE STORMWATER RETENTION POND DAM

N.D.I. PA. 01146 — BERKS COUNTY

DATA OBTAINED FROM PENNSYLVANIA GEOLOGICAL SURVEY WATER RESOURCES REPORT 44

PLATE F-1